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AN ASSESSMENT OF INTERORGANIZATIONAL RELATIONS BETWEEN
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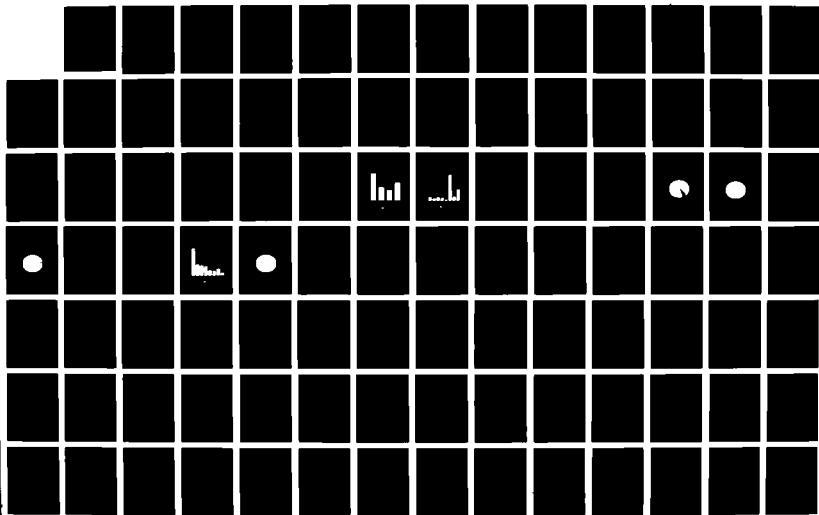
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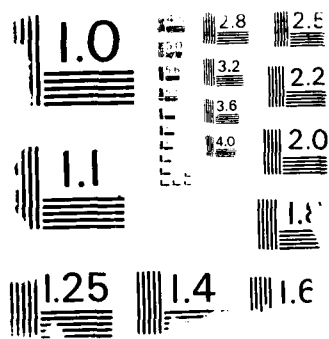
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AN ASSESSMENT OF INTERORGANIZATIONAL RELATIONS
BETWEEN NAVAL MEDICAL COMMAND NORTHEAST
REGION AND ITS SUBORDINATE UNITS

A Graduate Research Project
Submitted to the Faculty of
Baylor University
In Partial Fulfillment of the
Requirements for the Degree
of
Master of Health Administration

by
David Krieger
Lieutenant, Medical Service Corps
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TABLE OF CONTENTS

ACKNOWLEDGMENTS.....	iii
LIST OF TABLES.....	iv
LIST OF ILLUSTRATIONS.....	v
CHAPTER	
I. INTRODUCTION.....	1
Conditions Which Prompted This Study.....	1
Statement of the Research Problem.....	2
II. REVIEW OF THE LITERATURE.....	2
Interorganizational Relations in Public	
Organizations: Theoretical Perspective.....	4
Health Care Professionals in Organizations.....	9
Previous Treatment of Interorganizational	
Relations: General.....	11
Previous Treatment of Interorganizational	
Relations: Health Care Organizations.....	13
The Organization Assessment Framework.....	15
III. CURRENT STUDY.....	16
Objectives.....	16
Criteria.....	17
Assumptions.....	18
Limitations.....	19
Research Methodology.....	19
IV. RESULTS AND DISCUSSION.....	23
The Echelon Four Activities.....	23
Refining the Survey Instrument.....	28
Breakdown of the Respondent Population.....	28
General Analysis of Survey Questionnaire Data..	40
Analysis of Variance (ANOVA) Results.....	48
Regression Analysis Results.....	53
Endnotes.....	56
V. CONCLUSION.....	57
General Observations.....	57
Relationship with Selected Commands.....	58
Predictors of Interorganizational Relations....	60
Specific Recommendations.....	60
APPENDIX A. Interorganizational Relations Survey.....	63
APPENDIX B. Definition/Categories of Study Variables...	71
APPENDIX C. Computer Printouts for ANOVA and	
Regression Analysis.....	73
BIBLIOGRAPHY.....	103

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LIST OF TABLES

TABLE 1.	Abbreviations for echelon four commands.....	28
TABLE 2.	Breakdown of survey response rate by command.....	30
TABLE 3.	Corps distribution of respondents by command.....	33
TABLE 4.	Rank distribution of respondents by command.....	36
TABLE 5.	Breakdown of mean scores for interorganizational relations questions by command.....	41

LIST OF ILLUSTRATIONS

FIGURE 1.	Operating bed capacity for echelon four inpatient facilities.....	26
FIGURE 2.	Annual outpatient visits (medical and dental) for all commands (FY 87).....	27
FIGURE 3.	Percent of total respondents by command.....	31
FIGURE 4.	Corps distribution of total respondent population.....	32
FIGURE 5.	Rank distribution of total respondent population.....	34
FIGURE 6.	Ratio of size of administrative staff at the echelon four commands to GEOCOM staff by command.....	37
FIGURE 7.	Percent of respondents from commands physically located within/outside the proximate area of GEOCOM.....	38
FIGURE 8.	Histogram, ANOVA table, and Tukey's test results for question 2a.....	73
FIGURE 9.	Histogram, ANOVA table, and Tukey's test results for question 2b.....	75
FIGURE 10.	Histogram, ANOVA table, and Tukey's test results for question 3a.....	77
FIGURE 11.	Histogram, ANOVA table, and Tukey's test results for question 7a.....	79
FIGURE 12.	Histogram, ANOVA table, and Tukey's test results for question 7b.....	81
FIGURE 13.	Histogram, ANOVA table, and Tukey's test results for question 7d.....	83
FIGURE 14.	Histogram, ANOVA table, and Tukey's test results for question 11a.....	85
FIGURE 15.	Histogram, ANOVA table, and Tukey's test results for question 11b.....	87
FIGURE 16.	Histogram, ANOVA table, and Tukey's test results for question 13.....	89
FIGURE 17.	Histogram, ANOVA table, and Tukey's test results for question 17.....	91

LIST OF ILLUSTRATIONS (continued)

FIGURE 18.	Histogram, ANOVA table, and Tukey's test results for question 18.....	93
FIGURE 19.	Histogram, ANOVA table, and Tukey's test results for question 19.....	95
FIGURE 20.	Histogram, ANOVA table, and Tukey's test results for question 20.....	97
FIGURE 21.	Histogram, ANOVA table, and Tukey's test results for question 21.....	99
FIGURE 22.	Computer printout of summary results of stepwise multiple regression analysis.....	101
FIGURE 23.	Computer printout of final step in the stepwise multiple regression analysis.....	102

I. Introduction

Conditions Which Prompted This Study

Established in 1983, the Navy Medical Command Northeast Region is responsible for health care delivery to military beneficiaries in the northeast continental United States. A major reorganization of the Navy Medical Department created eight Geographic Commands (GEOCOMS); six within the continental United States and two overseas. This organizational design addressed a perceived excessive span of control of the Bureau of Medicine and Surgery in Washington, but also created an additional bureaucratic layer of administration. Some unfortunate but logical side effects of this reorganization are a perceived decrease in the effective level of communications throughout the Navy Medical Department, as well as confusion in defining the role, responsibility and in short, the efficacy of the GEOCOMS.

In June 1986 a Naval Inspector General team observed a major weakness within the Northeast Region consisting of "poor communications up and down the chain of command." Although this weakness was stated to be reflected in "the GEOCOM's marginal success in its oversight role," further clarification was not presented. Despite the lack of definitive deficiencies, problems center on:

1. Communication procedures between the GEOCOMS and subordinate commands (i.e., frequency, clarity, and necessity of both written and verbal communications).

2. Regard for command and control aspects of the GEOCOM (i.e., role conflict between the GEOCOM and subordinate commands). The Commander, Northeast Region, desires that a study be conducted which examines these two primary areas of concern with the expectation of developing strategies to either resolve present communications problems or reassess the current Navy Medical Department organizational structure.

Statement of the Research Problem

A study to determine the relative effectiveness of communications, command and control within the Naval Medical Command Northeast Region.

II. Review of the Literature

The field of interorganizational relations is a relatively new area of investigation compared to the more widely examined field of intraorganizational behavior and theory. Virtual volumes of research exists examining such aspects of organizations as communications between departments and between differing groups of employees, various forms of organizational design, social structure of work groups, power and influence, and dealing with change in the organization; to cite only a few areas. Names like Weber (1946), Simon (1946), and Thompson (1967), immediately come to mind in the field of general organizational behavior and theory (OB&T). In the health care organizational arena, few comprehensive works are available which focus the tenets of OB&T on the health care environment. Shortell and Kaluzney (1983), however, do offer one such work with extensive application of

classical theory to the health care sector.

Despite the presence of works by many well-known researchers in the field of general OB&T, as well as some minimal application of this discipline to the health care arena, literature which focuses on the relationship organizations have with external groups to which they are functionally linked or associated, is minimal. As late as 1984, Distefano conducted a review of research literature available in the area of interorganizational conflict. He concluded that an absence of empirical research was evident as well as a lack of consensus over key terms and objectives in the field.

It should be pointed out that a considerable amount of literature has been published concerning marketing or public relations efforts designed to enhance the organization's image among groups to which it is not functionally linked. Such groups, while important to the organization, are not formally or legally bound to the policies or direction of the organization and thus, managing this form of interorganizational relationship is more public relations or marketing oriented. This focus relates to what has been termed "environmental dependence" (Fottler et al, 1982).

Although a lack of related literature exists concerning the focus of this study, a limited amount of material is available which examines some aspects of OB&T within multi-organizational entities; networks of groups, who although external to the reference organization, together form a larger, more complex organization. Much of the research applicable to this study

focuses on relationships between units in the public sector, specifically governmental agencies or bureaus.

Additionally, one must not ignore some applicable principles from the intraorganizational field of OB&T which may shed some light on the specific aspects of this study. Certain phenomena inherent in the nature of health care professionals as well as the health care industry may also shed significant light on the focus of this study.

Interorganizational Relations in Public Organizations: A Theoretical Perspective

Perhaps the most comprehensive examination of organizational behavior and theory in public sector organizations is found in a classic work by Downs (1967). The author discusses these organizations in detail and describes such aspects as their functional roles, the environment in which they exist, the personnel or officials they employ, aspects of communication, their level of goal consensus, their ideologies and how they deal with the process of change. A number of organizational phenomena identified by Downs are applicable to this study.

In discussing the lifecycle of bureaus, Downs outlines some aspects necessary to insure survival of the organization. Crucial to this concept is the fact that organizations, particularly those of a public sector or agency nature, must demonstrate that their services are worthwhile to some group, especially those entities which hold influence over resources required to keep the organization alive. While this principle refers to those groups

above the organizational chain-of-command, a similar phenomenon relates to those groups which exist below the organization. Specifically, these groups must view the services of the organization as having value, in order for the organization to maintain its survival.

Not only must organizations demonstrate worth or value to external entities, it must also maintain some sense of autonomy. This concept is critical to public sector bureaucracies and is defined or realized by:

1. Possessing a distinctive area of competence.
2. Having a clearly demarcated clientele.
3. Possessing undisputed jurisdiction over a function, service, goal, issue, or cause.

Some organizations can achieve this autonomy by gaining growth and size, increasing the significance of its functions, or simply by having strong clientele with power.

Much of how an organization operates, the policies it adopts, and the attitudes it projects, is dependent upon the personnel or officials who carry out that organizations's function. (Downs refers to the organization's social function, although the Department of Defense can be viewed as a culture or "society" of its own). Individual differences in explicit goals as well as modes of perceiving reality, leads to conflict of interest among personnel; within the organization itself and between organizations. While Downs does not address health care organizations specifically, this notion is an important consideration in studies involving health care professionals.

While differences among personnel concerning explicit goals is an obvious source of conflict, differences in one's way of perceiving reality, and its contribution to conflict, is more subtle. Downs writes:

"Differences in modes of perceiving reality spring from the value structure implicit in the trained outlooks associated with various technical specialties. For example, engineers do not look at problems in the same way that economists or artists do. All three types might agree on explicit goals and even possess the same information, yet disagree on what the organization ought to do because their modes of perceiving that information emphasized different aspects of the problem."

The concept of formulating rules is discussed by Downs, from an interorganizational perspective. Quite simply, pressure exists for organizations to establish rules governing decisions, so outside groups can anticipate consistent responses and expect "equal treatment." Despite such formal rules, informal structures do arise in this arena. Once again, the personal needs of the organization's officials or members lead to such informal structures thus modifying the overall behavior pattern of the organization. Informal structures for dealing with external groups also arise to fill "gaps" in the formal rules or to adapt formal rules to fit unusual circumstances. Downs identifies three such instances where this a phenomenon is realized:

1. Tasks formally assigned to one person are many times carried out by another individual, or group of individuals. Thus,

outside groups may not know who is really carrying out a particular task or formulating policy.

2. If none of the officials or personnel have sufficient expertise or interest in a formal task, it may not be carried out at all or it may be accomplished in a poor manner.

3. When developing new policies or tasks, officials often operate outside of the formal structure. This is obviously more prevalent among organizations operating in rapidly changing and highly uncertain environments.

A related concept to organizational structure is that of communication channels or networks. The idea of both formal and informal level of communication within organizations is somewhat basic to management theory (Glueck, 1980). Formal communications are recognized as "official" and usually take the form of formal orders, directives, or reports. Downs refers to the informal communication network as "subformal" communications which conveys messages which are rarely written down and are learned by experience and previous examples. These subformal networks are often horizontal in nature thus connecting peers, messages sent along such a network can more easily be withdrawn, altered, enhanced, enlarged or even cancelled, and generally result in more candid form of communications. Additionally, those who are not "in-tune" with the subformal communications network often have the feeling of getting the proverbial "run-around" when dealing with the organization.

Subformal communications are particularly important as it impacts upon interorganizational relations. Downs explains that

subformal messages are useful to discuss things tentatively (especially new ideas), are more timely to disseminate, and are useful in keeping ideas from superiors, temporarily. Thus, subformal communications serve important functions in the relationships between organizations. One must keep in mind, however, that when two organizations are in strong conflict even subformal networks may not be successful in removing barriers to communications. Downs explains:

"Inter-bureau obstacles to communication are not so easily bypassed when two bureaus are in strong conflict. Then the informal networks of one may be substantially closed to members of the other by orders of top-echelon officials, a feeling of mutual hostility at all levels, or a tactical need to keep procedures and ideas concealed so as not to yield any competitive advantage in the conflict."

The issue of control processes, especially in the interorganizational realm, is raised by Downs and the following principles are offered for insuring effective control:

1. When issuing orders, the less ambiguous and general they are, the less discretion is delegated to subordinates.
2. Create information necessary to discover what subordinates are doing.
3. Select only small portions of all activity for review.
4. Use antidistortion devices to obtain compliance.

Since lower-level officials tend to distort information when passing it to higher-level authorities, mechanisms are needed to reduce this phenomenon to exercise effective control. One

antidistortion device is to require coordination among different sections of lower-level groups by overlapping functions. Still another more common approach is to conduct on-site inspections, preferably unannounced.

5. Establish and utilize separate monitoring agencies.

Before concluding this review of Down's, the phenomenon of instituting change in organizations must be touched upon. Some of the author's more important findings in this area are:

1. The larger the organization, the more reluctant it will be to adopt any given change.
2. Small bureaus tend to be more flexible and innovation minded than large ones.
3. One way to speed the adoption of a given change is to design it so that it affects the smallest possible number of persons.
4. All officials tend to oppose changes that cause a net reduction in the amount of resources under their own control.
5. All officials tend to oppose changes that decrease, the number, scope, or relative importance of the social functions entrusted to them.

Health Care Professionals in Organizations

As already mentioned, interorganizational relations are very much dependent upon the attitudes and backgrounds of the personnel assigned to the organizations in question. Perhaps in no other setting are conflict and power struggles between professional groups more prominent and challenging than in health care organizations. Kaluzny and Shortell (1983) suggest that high

status individuals in the health care setting play a crucial role in whether or not organizations can be effected. Physicians, for example, exert considerable influence on the health care organization and has done so form many years. Starr (1982) attributes this power to a "psychological dependence" upon the physician's knowledge. Coe (1978) explains that a profession's monopoly of knowledge usually leads to increased social status for its members.

The conflict and power struggle between the various professional groups (e.g., physicians, nurses, and administrators) in the health care organization is readily seen in the hospital. Smith, in a classic article written in 1955, describes the hospital as having "two lines of authority." He explains that although the non-physician administrator holds the chief position in the organization, "there is almost no administrative routine abrogated or countermanded by a physician.... Thus, the two main lines of authority-lay and professional-exist in the hospital." Concepts such as those described above must be taken into account when viewing interorganizational relations among health care organizations.

A related theory to consider when discussing the health care professional's involvement in interorganizational relations is that of role conflict. Stewart and Garson (1983) define interole conflict that occurs "when an individual holds two or more roles which are in tension with each other." This role conflict is exercised in the realm of interorganizational relations when professional health care clinicians must weigh the

goals of patient care (as they see it from individual professional perspectives) against administrative policies emanating from higher level organizations. No appropriate literature exists describing the health care professional's effect on interorganizational relations. However, an analysis of such relations in health care settings must not ignore the perspective of each of the prominent health care professional groups.

Previous Treatment of Interorganizational Relations - General

A study examining factors which determine or indicate the level to which state governments delegate discretionary authority to local government was conducted by Berman and Martin (1988). A number of determinants or variable effecting the granting of local discretion by states were set forth. Four areas of discretion were measured: structure, function, finances, and personnel. Findings revealed that variables of a demographic nature such as income, urbanization and education are strongly linked to structural discretion at the city level and somewhat linked at the county level. Perhaps more important, these variables and a variable identifying culture (termed "localism"), explained 23% of the variation. For the other three forms of discretion (function, finance, and personnel), the strongest correlation appeared with historical, cultural and managerial factors (variables which can be managed in public government, such as population levels, land area and number of governmental units). Although this study obviously differs from the health care setting, variables such as culture and historical roots are very much evident in the health

care setting, especially among health care professionals (as mentioned above). Additionally, in the aggregate, variables such as population size and land area may be appropriately applied to the concept of size of institution and/or size of area served. As an example, one might ask if larger health care organizations are given more discretionary authority than smaller ones in the same network? If so, is this reflected in how much they rely on the higher-level authority to accomplish their goals?

A study examining intergovernmental relations among Federal Administrative Regions and state governments was conducted by Crotty (1988). The study focused on the role of regional organizations in overseeing and coordinating the implementation of national policy at the state level. A dependent variable of acceptance and adoption of national policy (termed "primacy") is measured based upon the influence of four categories or tools of management exercised by the federal regions. The categories of tools are: (1) communication tools or the ability to traffic information; (2) treasury or financial tools which facilitate the ability to exchange; (3) authority tools; and (4) organization tools defined as the ability to act in the place of the states (using its power to sanction offenders).

Most significant in the findings were the following corollaries:

1. The more consistent the message from regional headquarters, the more likely states will follow national directives.

2. Growth in the amount of grant money distributed by a region positively affects its ability to foster primacy acceptance.

3. The use of the authority tool positively affects primacy acceptance. This finding was contrary to the more common hypothesis that the more a region uses its authority, the less likely states in the region are to accept primacy.

4. The greater the presence of the ability to act in place of the states (or levy sanctions) the greater the level of primacy acceptance. This finding was also contrary to the more common hypothesis of greater organization (sanction) leading to a lesser level of primary acceptance.

Crotty concludes that knowledge at the local level that the regional office will use the most stringent management tools available encourages acceptance of policy, this willingness to accept primacy is also dependent upon state's perception of how much regional intervention will occur, and finally, a positive, coercive management style is likely to encourage responsibility for enforcing national guidelines. (This last conclusion is based upon the state's belief that a strong chance exists that they will be regulated by national standards).

Previous Treatment of Interorganizational Relations - Health Care Organizations

A review and analysis of multi-institutional arrangements in health care by Fottler et al (1982) confirms what has already been suggested; that research concerning fundamental interorganizational phenomena as it applies to health care

organizations, is severely limited. The authors present some basics of organizational theory in general and touch upon a few theories taken from experiences with multi-institutional health care systems. Stressing the concept of efficiency, they report:

1. Within functionally organized systems, communication and coordination problems grow and efficiency decreases as geographical dispersion increases.
2. Efficiency is higher in more autonomously structured systems.
3. The optimum organizational structure for multi-institutional arrangements contains elements of both centralized and decentralized systems that vary by function.

The authors conclude with a call for more research of an interorganizational nature in the health care arena.

D'Aunno and Zuckerman (1987) describe some theoretical concepts concerning organizational federations among hospitals and define such federations as a form of multiorganizational collaboration in which a management group coordinates and directs the activities of three or more organizations. A key difference between this form of organizational network and the organization upon which this study is based, is the voluntary nature of member organizations. Hospitals are not forced to enter the federation and can ultimately exit the group as long as such an exit meets the terms of the original agreement. Nevertheless, a number of principles set forth by the authors are worth considering. To begin, a key goal upon which the success of federations is based is cooperation among member hospitals, with each other as well as

with the management group of the federations. Other important theories outlined in this work are:

1. While federations can facilitate and expedite decision making, they tend to reduce the influence or autonomy of individual members.
2. The more uncertain managers in the member hospitals are about securing resources outside the federation, the more likely it is that the federation can gain commitment by meeting member needs.
3. Perhaps most important, member organizations are more likely to risk resources for the federation when there is a high degree of trust and shared values and expectation among members.

One should keep in mind that although organizations might be bound to a larger network of organizations, as is the case in this study, lower-level organizations can still limit their cooperation and participation through a variety of more subtle means.

The Organizational Assessment Framework

Van de Ven and Ferry (1980) provide a framework known as the Organization Assessment (OA) which outlines a process for assessing organizations. The authors build their assessment process upon Simon's (1946) theory that to properly explain the performance of organizations, one must identify the dimensions of "context, structure, and behavior" under which the organization operates. This concept is applied to the OA, which encompasses four levels of analyses or modules for examining organizations:

the overall organization, work groups or units, individual jobs, and relationships between units. This research project is concerned with relationships between organizations and therefore relies heavily on Van de Ven and Ferry's Interunit Module analysis. This module provides questionnaires used to measure characteristics of the relationships organizations have with other external units.

The questionnaire adapted for this research project measures, as mentioned earlier, the context, design (structure) and outcome (behavior) of organizational relations. The authors claim content validity by group review and consensus, intrinsic validity by a principle component factor analysis, and external validity by analysis of variance of questionnaire indices and correlation/multiple regression analysis of variation in performance indices. In designing questionnaires, the authors made an attempt to reach clarity, consistency, precision, variety, and objectivity uniqueness in constructing statements. Finally, a discussion on problems in maintaining reliability when aggregating response data is offered. The authors state that their survey instrument obtains measures of member, relational and global data which are structured to overcome reliability deficiencies.

III. Current Study

Objectives

The objectives of this research project are to:

1. Review the literature regarding interorganizational relationships, with an emphasis on communications and perception of role.

2. Assess the perceptions of management personnel assigned to Navy Medical Department echelon four commands regarding the effectiveness of communications/relations with the GEOCOMS by developing and administering a survey instrument which measures context, design, and outcome factors of interorganizational coordination (communication) and control (role) between the GEOCOMS and subordinate commands.

3. Analyze the survey data with an emphasis on identifying differences among subordinate commands and determine key factors contributing to effective communications/relations within the GEOCOM.

4. Based on examination of this collected data, make recommendations to the GEOCOM Commander as to possible areas to focus upon to improve communication/relations between the GEOCOM and subordinate commands.

Criteria

The criteria for this research project includes the following:

1. The population to receive the survey instrument is to consist of those personnel in significant middle and upper managerial/administrative positions and whose area of responsibility or functional operation is influenced by GEOCOM actions or policies. Department Heads and Special Assistants are prime examples of the respondent population. Respondents can

range from the Commanding Officer to a Junior Officer Department Head, can be clinical or administrative in their professional background, and can be senior enlisted or civilian members provided they meet the above descriptions. In determining eligibility to complete the survey, the distinguishing characteristic is not only the extent to which the respondent's activities are effected by the GEOCOM, but how aware the respondent is of GEOCOM involvement in the activities of his/her command. For example, while the activities of the GEOCOM can indeed effect the operation of a medical clinic, individual staff physicians may not be aware of the GEOCOM's role in this regard. This problem is somewhat eliminated by limiting the survey to individuals in managerial/administrative roles. It is possible, however, for a clinical Department Head to be unaware of the extent to which the GEOCOM affects his department.

2. Respondents must have been assigned to the subordinate command for at least six months.

3. To achieve statistical significance, comparisons or differences must be significant at the .05 level.

Assumptions

For the purposes of this research, it is assumed that:

1. The GEOCOMs have been in place long enough that organizational relationships are somewhat stable and characteristics of these relationships are identifiable.

2. The mean of all responses of those persons surveyed in each command reflect the opinion of that command as a single unit.

3. All subordinate commands included in the study will participate in the completion of the survey instrument.

4. A minimum period of six months on board is necessary for an individual to obtain sufficient "corporate knowledge" to make judgments concerning the relationship with the GEOCOM.

Limitations

This research is constrained by the following factors:

1. This study represents a cross-sectional view of organizational relations and does not attempt to account for past and future trends of such relations (i.e., a longitudinal assessment).

2. The focus of the study is relationships between the GEOCOM and subordinate commands and does not examine macroorganizational aspects of the Navy Medical Department structure, structural aspects of individual units (i.e., subordinate command structure), or individual jobs or positions within units.

3. Distance to most subordinate commands and time requirements preclude on-site administration of the survey instrument and necessitates a mail-in response.

4. To control measurement aggregation problems, completion of the survey tool is limited to only those personnel in significant middle and upper managerial/administrative positions as described in the research criteria.

Research Methodology

The methodology used to conduct this research includes the

following:

1. Examination of interorganizational relationships and dynamics concepts is accomplished by a review of the literature. Whenever possible, the literature review focuses on communications and role conflict between organizations.

2. The survey instrument is designed to measure the perspective of key management personnel at the echelon four level concerning the context, design, and outcome of the relationship between their command and the GEOCOM. Those individuals surveyed use a Likert scale to respond to statements assessing various aspects of the relationship. A copy of the survey instrument is provided as appendix A. It is adapted from Van de Ven and Ferry's (1980) Organization Assessment Instrument Other Unit Questionnaire.

3. Key staff members of the Naval Medical Command Northeast Region such as the Commander, Chief of Staff, Assistant Chiefs of Staff, and respondents at a selected subordinate command of the GEOCOM review and critique the proposed questionnaire to assess the time required to complete, clarity of wording, and other aspects of the survey instrument (U.S. Army Organizational Effectiveness Center and School, 1983).

4. After appropriate revisions to the survey are made, it is distributed to each subordinate command of the Northeast Region. A cover letter, signed by the Northeast Region Commander, accompanies each survey soliciting input and outlining the intent of the study. Because of the limited population surveyed, maximum return of the survey instrument is crucial. Homan et al. (1986)

suggests that a response rate of 70% or higher is good.

Commanding Officers of each subordinate command assign a contact point to work closely with the resident to insure the successful administration of the survey instrument. Each contact point is tasked with:

- Providing the resident with a roster of potentially eligible respondents.
- Assisting the resident in identifying those individuals most appropriate to receive the survey.
- Assisting in actual distribution of the survey to identified personnel.
- Insuring that a maximum rate of return of the survey instrument is achieved.
- Maintaining anonymity of respondents by returning all completed surveys to the resident with no indication of respondent identity.

5. Analysis of variance (ANOVA) is used to test the hypothesis that the perceptions of key management personnel at subordinate commands within the region are all similar with regard to communications/relations with the GEOCOM. Specifically, the following hypotheses is examined:

Ho: There is no difference among subordinate commands concerning perceived communications/relations with the GEOCOM.

Ha: There is a difference among subordinate commands.

Point values from Likert scale ratings are used to arrive at an arithmetic mean value for each question for each echelon four

command. To compare answers of each subordinate command, an ANOVA table is established for each question asked and the variance ratio computed and compared with the critical value of F obtained by using Table J. in Daniel's Biostatistics: A Foundation for Analysis in the Health Sciences (1983). This value is tested at the .05 level of significance. If the null hypothesis is rejected in favor of the alternate hypothesis, (perceptions of subordinate commands differ), Tukey's honestly significant difference (HSD) test is conducted to determine which commands differ. The .05 level of significance is also used for this test.

6. A stepwise multiple regression analysis is conducted using the following model:

$$Y_j = B_0 + B_1X_{1j} + B_2X_{2j} + B_3X_{3j} + B_4X_{4j} + B_5X_{5j} + e_j$$

where: Y = dependent variable (interorganizational relations as measured by the survey instrument)
 B = regression coefficients
 e = error term
 X = independent variables

The dependent variable, Y, is computed by totaling each respondent's scores for all survey questions. Most survey questions are designed so that high numbers indicate effective or positive interorganizational relations. Those that are designed in reverse direction are scored in such a way as to maintain consistency in calculating the Y dependent variable. The independent variables $x_1 \dots x_5$ are defined as follows:

- X1 - whether or not the subordinate command is physically located in the proximate area of the GEOCOM.
- X2 - ratio of size of administrative staff at the subordinate command to region staff.
- X3 - concurrence of respondent's Corps with Corps of GEOCOM Commander (binary variable).
- X4 - specific Corps of respondent (Medical, Nurse, Medical Service, or Dental).
- X5 - military rank or civilian pay-grade of respondent.

Variation as determined by the stepwise regression model is calculated by computer model and steps are performed until a tolerance level, established by the statistical software package, and based upon the computed F-value, is reached. The purpose of the regression model is to explain any variation in relations between subordinate commands and the GEOCOM due to the above defined independent variables.

IV. Results and Discussion

The Echelon Four Activities

The Naval Medical Command Northeast Region, one of eight geographical medical commands in the Navy Medical Department, is responsible for effecting adequate, appropriate, and efficient health care delivery to authorized military beneficiaries in a nineteen-state geographic area of the northeast United States. This mission is carried out through the efforts of eight major

medical/dental commands, numerous branch clinics (echelon five), and one drug screening laboratory. This study focuses on the eight major medical/dental commands described as follows:

1. Naval Hospital Great Lakes. The largest hospital in the region, it maintains an authorized bed capacity of 159 and conducts approximately 196,000 outpatient visits annually. Oversight responsibility includes branch clinics at Great Lakes, Glenview, Illinois, Cleveland, Ohio, and Detroit, Michigan.
2. Naval Hospital Philadelphia. Frequently under fire concerning its possible closure, the Naval Hospital at Philadelphia has recently become part of the Department of Defense mandated Delaware Valley Health Services System (DVHSS). The hospital still reports to Naval Medical Command Northeast Region, but functions in a cooperative effort with other hospitals in the DVHSS. It maintains an authorized bed capacity of 78 and conducts approximately 112,000 outpatient visits annually.
3. Naval Hospital Groton. With the newest physical plant of any of the echelon four hospitals, Naval Hospital Groton maintains an authorized bed capacity of 60 and conducts approximately 180,000 outpatient visits annually. Two branch clinics are assigned to this hospital and construction is underway for an expanded outpatient clinic area.
4. Naval Hospital Newport. Maintaining an authorized bed capacity of 106 and conducting approximately 134,000 outpatient visits annually, Naval Hospital Newport also is

responsible for three branch clinics including one in Argentia, Newfoundland.

5. Naval Medical Clinic Portsmouth. Operating an outpatient facility only, the clinic supports a naval shipyard as well as maintaining oversight responsibility for three branch clinics. Approximately 32,000 outpatient visits are conducted annually at the Portsmouth clinic alone.

6. Naval Dental Clinic Great Lakes. This command provides direct support to Recruit Training Command and Service School Command, as well as to staff members of all local commands. This command is also responsible for oversight of dental programs at numerous branch dental clinics located in several adjacent states. Approximately 1,673,000 dental visits are conducted annually.

7. Naval Dental Clinic Philadelphia. This command supports the local shipyard and performs an oversight role for branch clinics in New York, New Jersey and Pennsylvania. Approximately 214,000 dental visits are conducted annually.

8. Naval Dental Clinic Newport. Covering a wide area extending from New York to Northern Maine, this command conducts approximately 702,000 dental visits annually.

Figure 1 depicts graphically hospital bed capacity for all hospitals within the region. Figure 2 depicts annual visits for hospitals (outpatient) and medical/dental clinics for fiscal year 1987. Table 1 below provides the abbreviations used in the majority of figures and tables to identify each of the echelon four commands.

Operating Bed Capacities

Echelon Four Hospitals

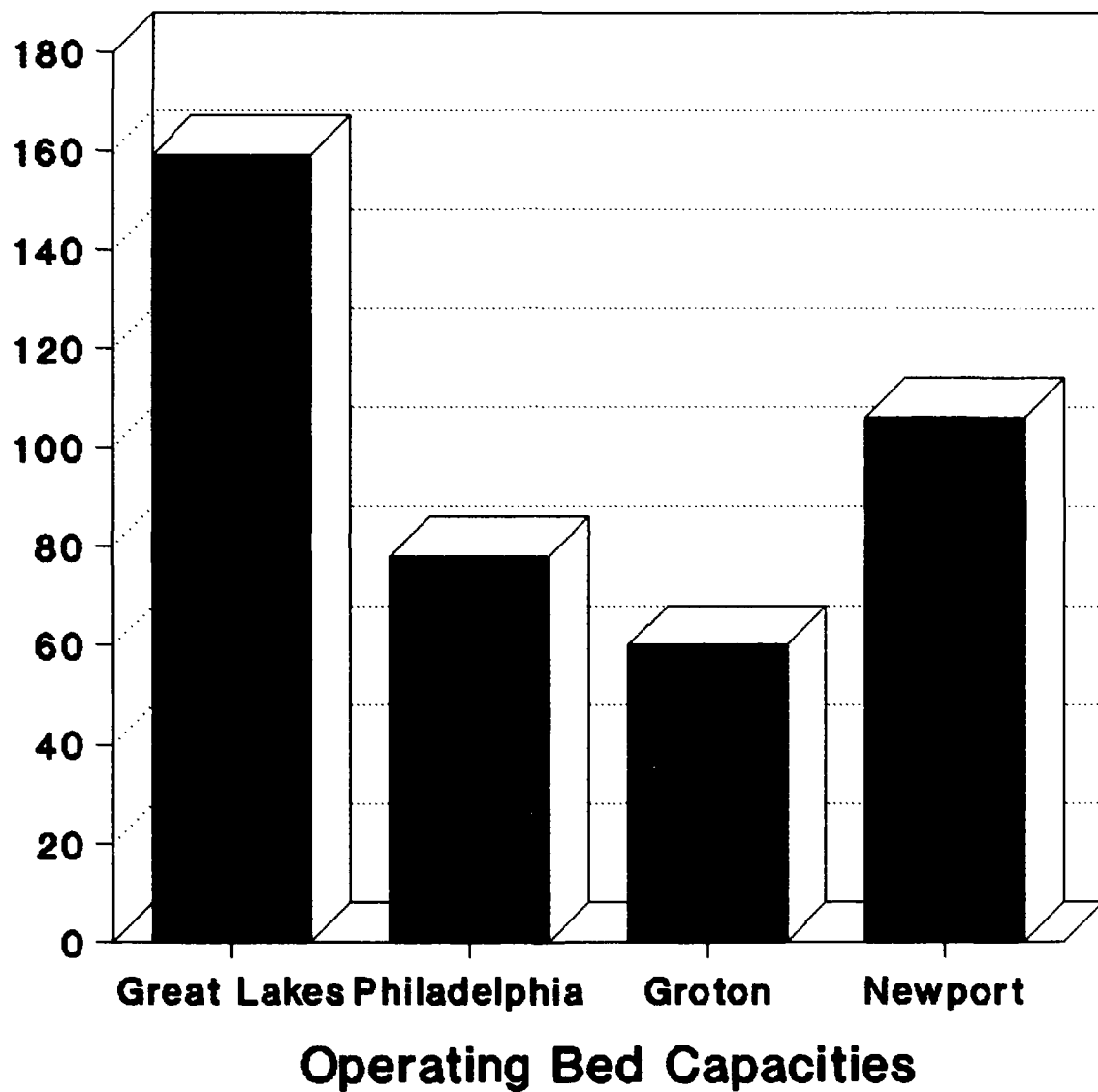


Figure 1

Annual Outpatient Visits

All Commands

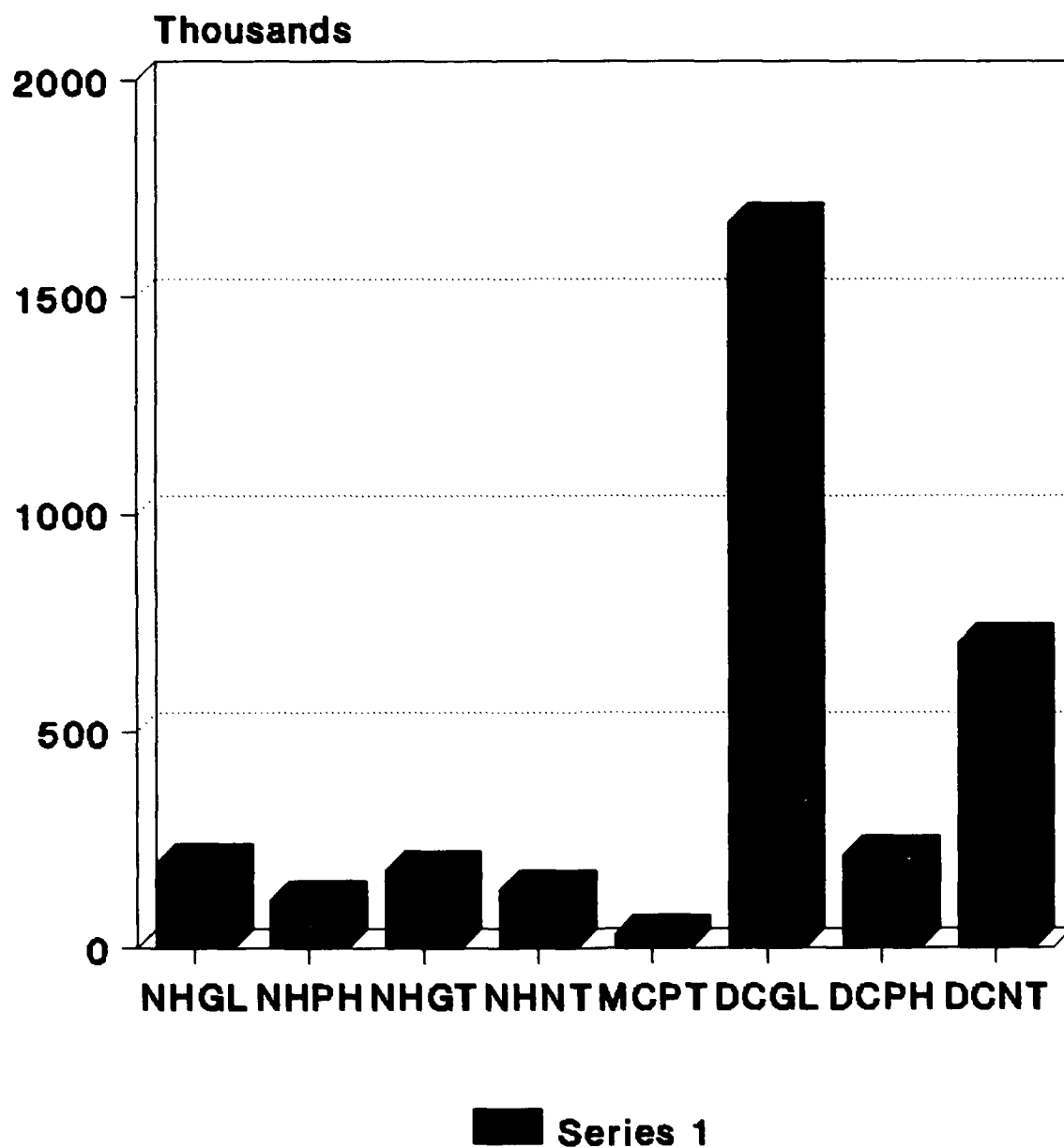


Figure 2

Abbreviation	Command
NHGL	Naval Hospital Great Lakes
NHPH	Naval Hospital Philadelphia
NHGT	Naval Hospital Groton
NHNT	Naval Hospital Newport
MCPT	Naval Medical Clinic Portsmouth
DCGL	Naval Dental Clinic Great Lakes
DCPH	Naval Dental Clinic Philadelphia
DCNT	Naval Dental Clinic Newport

Table 1. Abbreviations for echelon four commands

Refining the Survey Instrument

The survey instrument was reviewed by nine senior officers at the Northeast Region headquarters to further refine the clarity and appropriateness of each question as well as the overall focus and ease of completion of the instrument. As a result of this review, numerous questions were revised, the order of some questions was changed, and several questions were eliminated. The final survey contained 30 questions, down from 38 in the original instrument. Some useful changes were also made to the set of introductory questions, designed to better assess characteristics of the respondent population.

Breakdown of the Respondent Population.

A total of 160 surveys were distributed to specific individuals as specified by the points of contacts at each echelon four activity. Of this number, 129 surveys were completed and

returned yielding a response rate of 81%. Based upon criteria set forth in the initial stages of this study, identified by reviewing the introductory set of questions contained in the survey, an additional 24 survey instruments were eliminated from the total returned. The population size for statistical analysis is therefore 105. Since 24 respondents were inappropriately given the opportunity to complete the survey, the true response rate is 77% (105/136). A complete breakdown of number of surveys distributed, number completed, and number eliminated for each echelon four activity is provided in table 2 along with respective response rates for each command. Naval Hospital Great Lakes accounts for almost 1/3 of the total respondent population, the three other inpatient facilities represent slightly less than 1/2 of the population and the remaining smaller commands account for approximately 1/4 of the respondent population. Figure 3 depicts the distribution of respondents by command as a percentage of the entire respondent population.

Figure 4 presents a breakdown of the respondent population by officer corps. The majority of the respondents are Medical Service Corps Officers (50%) and almost 1/4 (23%) are categorized as "other" (see appendix B). A somewhat similar breakdown is evident when one examines the distribution by command with the exception of a greater percentage of Dental Corps Officers being represented at most of the dental commands. A breakdown of respondent corps by command is provided in table 3.

The distribution of total respondents by rank/paygrade is presented in figure 5. Most significant is the fact that almost

Table 2. Breakdown of survey response rate by command

<u>Command</u>	<u>Distributed</u>	<u>Returned</u>	<u>Eliminated</u>	<u>Final Respondent Population</u>	<u>Response Rate</u>
NHGL	58	43	9	34	69% (34/49)
NHPH	24	21	6	15	83% (15/18)
NHGT	21	17	1	16	80% (16/20)
NHNT	19	14	0	14	74% (14/19)
DCPH	14	13	4	9	90% (9/10)
MCPT	10	7	1	6	67% (6/9)
DCGL	9	9	3	6	100% (6/6)
DCNT	5	5	0	5	100% (5/5)
TOTAL	160	129	24	105	81% (105/136)

Total Respondents *By Commands*

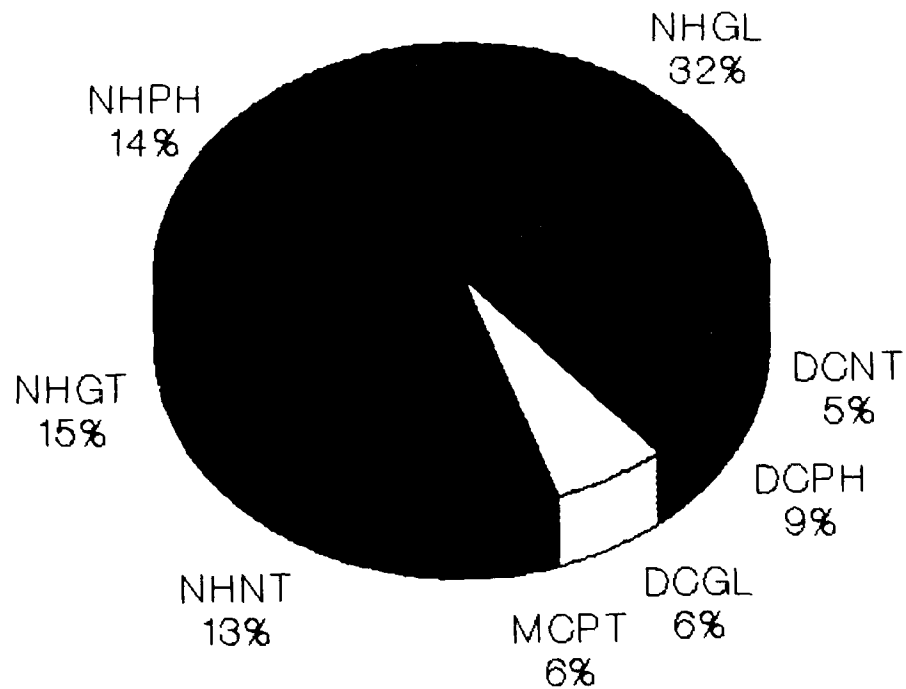


Figure 3

Corps Distribution

Total Respondent Population

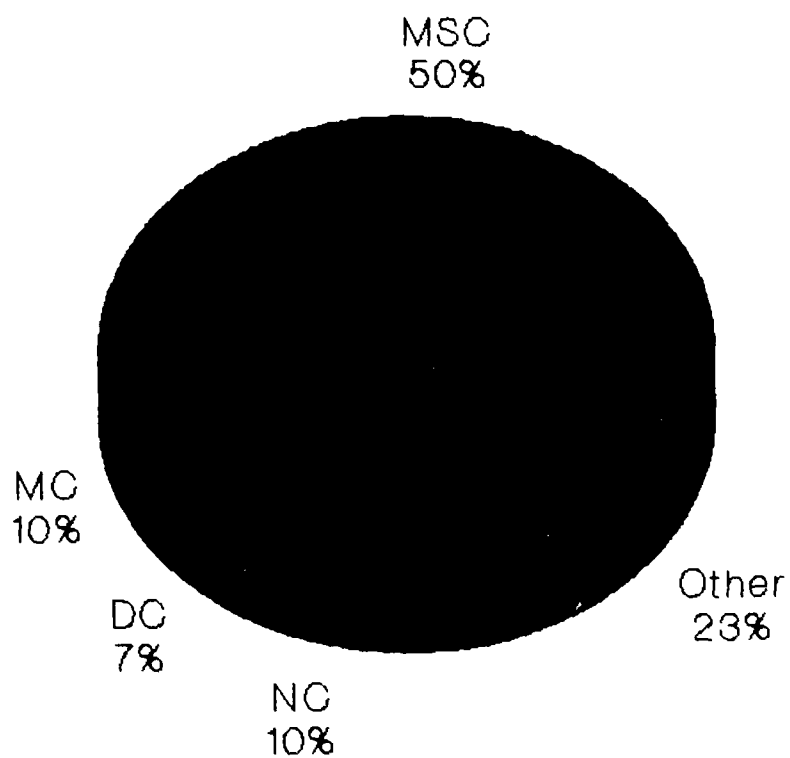


Figure 4

Table 3. Corps distribution of respondents by command

	Command																	
	NHGL		NHPH		NHGT		NHNT		DCPH		MCPT		DCGL		DCNT		OVERALL	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
MSC..	15	44%	9	60%	8	50%	9	64%	1	11%	5	83%	3	50%	2	40%	52	50%
MC...	7	21%	2	14%	1	6%	1	7%	0	0%	0	0%	0	0%	0	0%	11	10%
DC...	0	0%	0	0%	0	0%	0	0%	4	45%	0	0%	2	34%	1	20%	7	7%
NC...	3	9%	2	13%	3	19%	3	21%	0	0%	0	0%	0	0%	0	0%	11	10%
OTHER	9	26%	2	13%	4	25%	1	7%	4	44%	1	17%	1	16%	2	40%	24	23%
TOTAL	34	100	15	100	16	100	14	100	9	100	6	100	6	100	5	100	105	100

Rank Distribution

Total Respondent Population

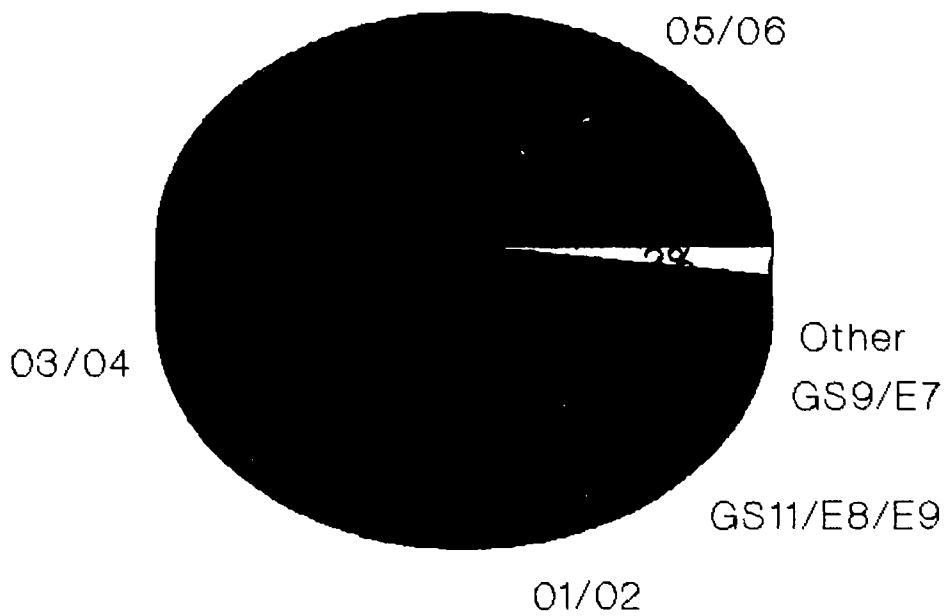


Figure 5

3/4 of the respondents are officers in the grade of lieutenant and above (73%). The next highest percentage group are those individuals in the civilian grade of GS-11 and military paygrade of E-8/9 (13%). Table 4 provides a breakdown of rank distribution of respondents by command. In the case of all commands, the majority of respondents are in the grade of lieutenant and above. More junior categories of rank/grade, however, are represented to a greater extent in the dental commands than in their non-dental counterparts. This is probably a result of smaller command size and resulting smaller respondent population.

A comparison of ratio of size of administrative staff at each command to region staff is presented in figure 6. The methodology used to calculate these ratios can be found in appendix B. As can be deducted from the size of the respondent population for each echelon four activity, the highest ratios are found at the four inpatient facilities, Naval Hospital Great Lakes being the largest.

Of all eight commands surveyed, only the two Great Lakes based activities can be considered to be physically located in the proximate area of the regional headquarters. (Naval Hospital and Naval Dental Clinic Great Lakes). Thus, 40 respondents or 38% of the total respondent population are categorized in this manner. This property of the population is illustrated in figure 7.

The above description of the respondent population gives some insight into the nature of the study group. Some of the population properties are appropriate and useful for an analysis of interorganizational relations. First, the high percentage of

Table 4. Rank distribution of respondents by command

Rank or Pay- Grade	Command																	
	NHGL		NHPH		NHGT		NHNT		DCPH		MCPT		DCGL		DCNT		OVERALL	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
05/6	13	38%	4	27%	4	25%	4	29%	3	33%	1	17%	2	33%	1	20%	32	30%
03/4	12	35%	9	60%	6	38%	8	57%	2	22%	4	67%	2	33%	2	40%	45	43%
01/2	3	9%	0	0%	2	12%	1	7%	0	0%	0	0%	1	17%	0	0%	7	7%
GS11/ E8/9	5	15%	2	13%	3	19%	1	7%	1	11%	1	16%	0	0%	1	20%	14	13%
GS9/ E7	1	3%	0	0%	1	6%	0	0%	1	12%	0	0%	1	17%	1	20%	5	5%
OTHER	0	0%	0	0%	0	0%	0	0%	2	22%	0	0%	0	0%	0	0%	2	2%
TOTAL	34	100	15	100	16	100	14	100	9	100	6	100	6	100	5	100	105	100

Ratio of Size of Admin. Staff *Echelon 4 to GEOCOM Staff*

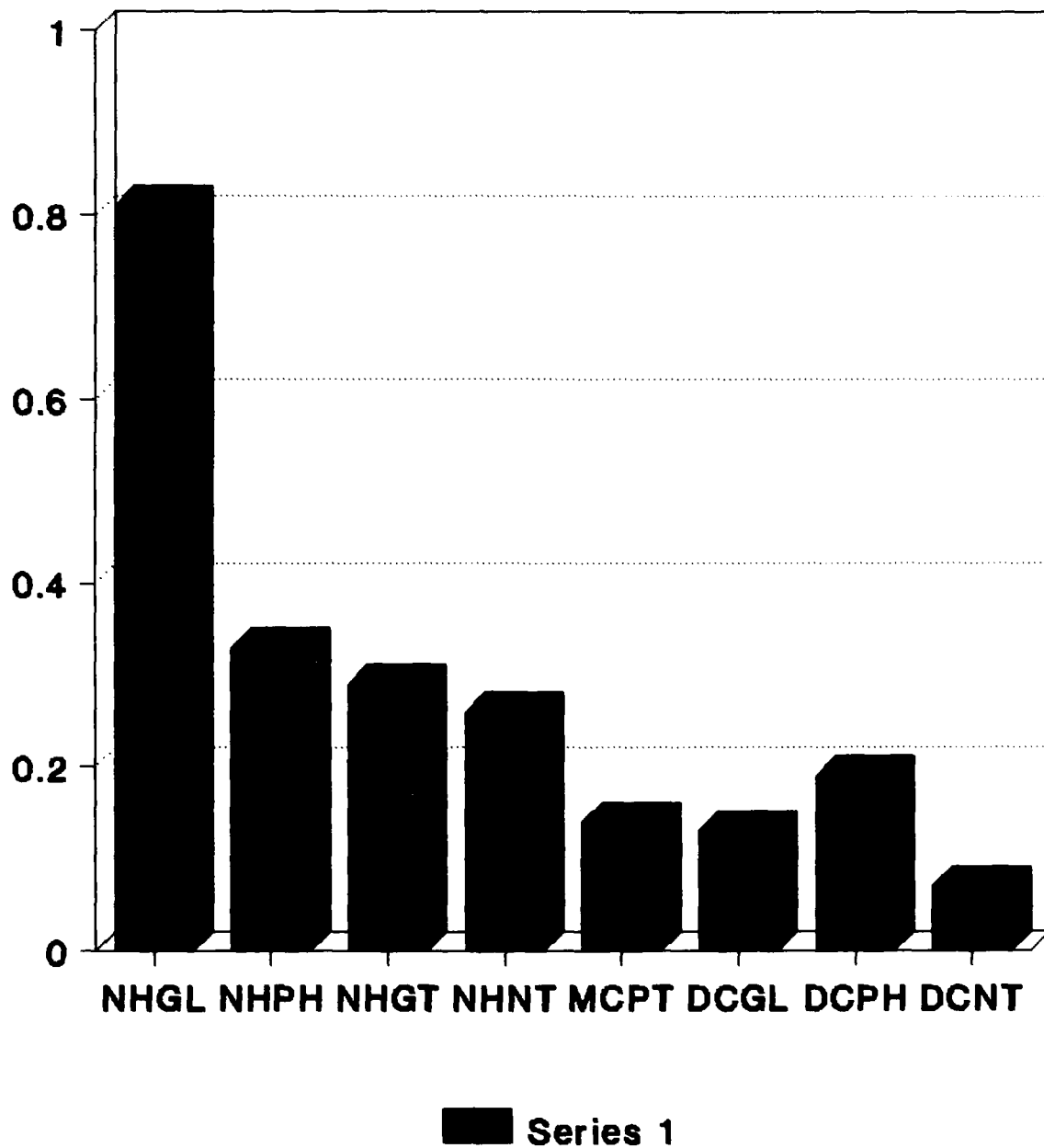


Figure 6

Respondents From Commands *Local vs Outside GEOCOM Area*

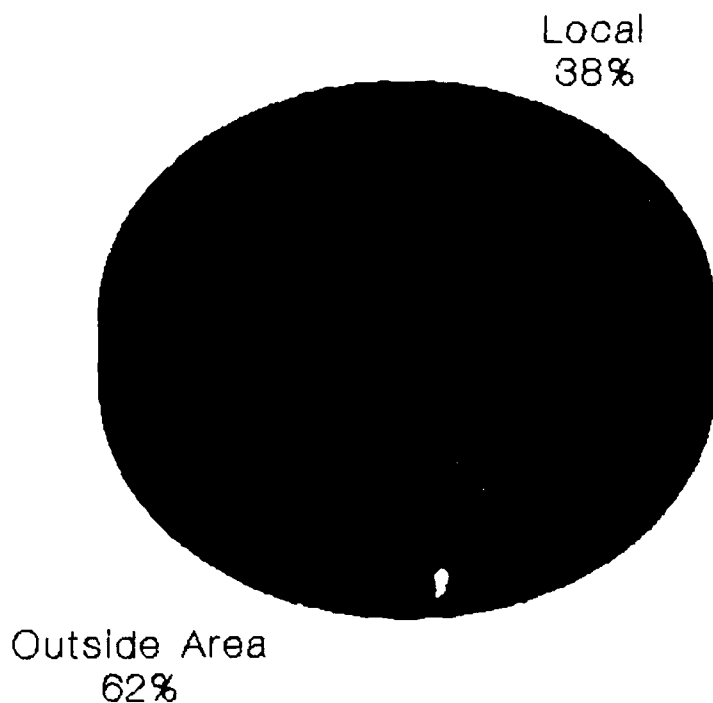


Figure 7

Medical Service Corps Officers is understandable since they are the most prominent individuals involved in administrative aspects of a military health care facility. In most cases, they are more likely to interact with external bodies, especially in the areas of implementing policies of higher authority. Since the majority of other respondents are clinicians, they tend to focus their activity more on internal matters of the organization, usually patient care. Exceptions do exist, but such persons are usually senior level officers who, because of their seniority, are placed in administrative or managerial roles, such as Director of Nursing, Executive Officer, Medical Director, or Commanding Officer.

Second, the fact that the vast majority of respondents are officers in the grade of Lieutenant and above is equally important. Middle and senior level managers, represented by the officer rank of Lieutenant and above, provide the most appropriate perspective of an organization's interactions and relation with outside forces, especially higher-level authority. Such personnel, especially senior officers, can effect, to a great extent, the overall attitude and perspective of a command concerning its relations with other organizations to which it is linked (Hambrick and Mason, 1984; Schein, 1986).

Finally, the ratio variable is an appropriate indicator of interorganizational relations since it centers on those individuals who are likely to interact with outside entities, including higher-level authority. Use of size alone (by total personnel, size of physical plant, financial indicators, or other

similar measures) tends to dilute the assessment of interorganizational relations. Thus, the use of ratio of size of administrative staff at the subordinate command to region staff provides a more direct measure of interorganizational relations. The effect of command size, however, is not completely masked using the ratio measure. As found in the above descriptive data, the higher the computed ration, the greater the size of the command.

General Analysis of Survey Questionnaire Data¹

All statistical analyses were conducted using the BMDP Statistical Software Package (Dixon, 1983). Survey responses for descriptive variables were entered in the statistical package in accordance with preset categories identified in appendix B. Responses to specific questions pertaining to facets of the interorganizational relationship were entered using the Likert scale associated with each question.² Questions 14a,b,c and d were eliminated from the data set after all survey instruments were returned and thus did not contribute to the analysis.³

Table 5 compiles mean scores for interorganizational relations questions by command as well as provides the overall mean score for each question for the entire respondent population. Results are as follows:

Question 1. There appears to be a higher than average level of awareness among all echelon four activities concerning the specific goals and responsibilities of the GEOCOM. All commands are at least somewhat informed concerning these goals and responsibilities and one command was quite informed. This is an

Table 5. Breakdown of mean scores for interorganizational relations questions by command

Quest.	Command									
No. *	NHGL	NHPH	NHGT	NHNT	DCPH	MCPT	DCGL	DCNT	OVERALL	
1	3.206	3.600	3.250	3.714	3.556	3.833	3.667	4.400	3.486	
2A	2.441	3.333	2.875	3.286	3.556	3.667	4.167	3.000	3.038	
2B	2.367	2.733	2.733	2.357	3.444	3.400	4.167	3.600	2.789	
3A	2.294	3.400	2.813	3.429	3.556	3.833	4.333	2.800	3.019	
3B	2.676	3.333	2.813	2.571	3.556	2.167	4.167	3.000	2.924	
3C	3.147	4.267	3.188	3.571	3.444	3.667	3.833	3.600	3.486	
4	2.636	2.667	2.733	3.000	2.667	3.667	4.000	3.000	2.864	
5A	2.912	3.467	2.625	3.429	2.333	2.500	3.333	3.000	2.971	
5B	1.727	2.667	2.133	2.643	3.111	2.167	2.500	1.600	2.233	
6	3.294	3.933	3.313	3.000	3.778	3.500	4.333	4.800	3.533	
7A	2.265	2.933	2.563	2.643	3.667	3.333	3.333	5.000	2.829	
7B	1.853	1.600	0.750	1.000	1.111	1.167	3.167	2.200	1.529	
7C	2.912	3.600	3.563	2.929	3.667	3.333	4.333	4.000	3.333	
7D	0.647	1.133	0.750	0.429	1.111	1.167	1.833	0.800	0.848	
8	2.727	2.429	2.600	3.429	2.000	2.667	3.000	2.600	2.706	
9	1.970	2.000	1.937	1.929	1.778	1.667	2.167	2.200	1.951	
10	2.152	2.133	2.000	1.929	1.778	1.500	2.000	2.000	2.010	
11A	1.281	1.929	1.250	2.143	2.444	2.000	1.333	2.200	1.676	
11B	1.562	1.929	1.250	2.286	3.000	2.167	1.833	2.200	1.873	
11C	1.387	1.769	1.500	1.231	2.375	1.167	2.667	2.000	1.612	
12A	2.879	3.200	2.562	2.786	3.667	2.667	3.000	3.400	2.952	
12B	3.121	3.733	3.188	3.308	3.889	2.667	3.000	3.200	3.282	
13	2.242	2.133	1.333	1.214	1.444	1.667	1.500	1.200	1.757	

*see appendix A

Table 5. Breakdown of mean scores (continued)

	NHGL	NHPH	NHGT	NHNT	DCPH	MCPT	DCGL	DCNT	OVERALL
15	2.417	3.167	2.750	3.000	2.667	3.000	4.000	3.000	2.792
16	2.324	2.267	1.867	1.692	1.778	2.000	1.333	2.600	2.058
17	1.735	2.000	1.250	1.929	1.778	2.000	3.333	1.600	1.827
18	2.324	2.533	2.312	2.429	2.333	2.667	4.000	2.000	2.467
19	2.353	2.800	2.438	2.429	2.444	2.833	4.333	2.200	2.581
20	2.176	3.267	3.063	3.214	3.333	3.000	4.500	3.000	2.924
21	3.206	3.067	2.267	3.000	2.333	2.833	3.667	2.600	2.923

important concept as it relates to such measures as goal consensus and conflict.

Questions 2a and b. On the issue of consensus of command priorities, and methods used to accomplish tasks, overall data shows commands generally agree with the GEOCOM to some extent on such matters.

Questions 3a, b, and c. Specific forms of resource flows are measured in this set of questions, whether it be tangible resources (money, personnel, etc.), or non-tangible such as technical assistance or information concerning policy or operations. Analysis of all three questions reveals that, overall, commands are most involved in receiving or sending information for purposes of coordination, control, planning or evaluation.

Question 4. The level of resource dependency often determines other factors of interorganizational relationships (Van de Van & Ferry, 1980). In this area, overall, commands believe that to accomplish their goals and responsibilities, they need the services, resources or support of the GEOCOM only to some extent, For some commands, this need was even less. This phenomenon is an important one since it tends to threaten the survival of the sovereign organization.

Questions 5a and b. This set of questions measures the formalization of interagency agreement. It gauges the extent to which the role behavior and activities of each party are clearly set forth. As a group, echelon four commands appear to perceive that the terms of the interorganizational relationship are

verbalized or discussed to some extent, but written down in detail to a lesser extent. In both measures, overall mean scores leaned toward the less favorable end of the Likert scale.

Question 6. The extent of information flow between organizations can be measured by frequency of communication. Frequency of communication as, measured by this question, is above average, overall. Group mean score indicates that command communicate with the GEOCOM about every two weeks to about weekly.

Questions 7a, b, c, and d. This set of questions measure the methods or tools by which information is most likely to flow between organizations. Data analysis indicate that, overall, echelon four activities communicate primarily by telephone, to a lesser extent by written letters, memos, or reports, and to the least extent, through group or committee meetings. This may be interpreted by some as a positive finding since it could reveal efforts to limit the extensive use of written correspondence (administrative paperwork) and encourage greater use of more expedient forms of communication.

Question 8. This question relates to not only an indication of resource dependency, but to a possible willingness to establish rapport with the sovereign organization. The group mean score indicates that in all communication with the GEOCOM, the majority of commands initiated such communications in slightly less than 50% of all cases (see appendix B for percentage conversion scale).

Question 9 and 10. These two questions refer to the quality of communication between organizations and relates to properties

such as the clarity and ease of sending messages. In both measures, overall mean scores leaned toward the more favorable end of the Likert scale. In the majority of cases little or no difficulty was experienced in reaching GEOCOM members and rarely were echelon four members misunderstood when communicating with GEOCOM staff.

Questions 11a, b, and c. This set of questions relates to the extent to which one organization affects the operation of another. Overall results indicates that for the majority of commands, less than 20% of their time is spent on GEOCOM matters and less than 20% of all technical assistance and services are received from the GEOCOM. This would indicate that the effect of the GEOCOM upon the operations of the echelon four commands is minimal. While this may indicate a positive quality of less interference with individual command operations, it also could further threaten the survival or continued existence of the GEOCOM.

Questions 12a and b. The level of formality in the interorganizational relationship, especially in the area of communications, is measured by these two questions. Results indicate that the echelon four command feel that standard operating procedures have been established regarding coordination with the GEOCOM to some extent, and to a slightly greater extent, formal communication channels are followed. This would indicate that subformal networks, while always in existence to some extent, are not extensively utilized in the communication process with the GEOCOM staff.

Question 13. The level of disagreements or disputes between organizations is a general indicator of the quality of the interorganizational relationship. It may serve as an indicator of stress on the relationship and a possible lack of goal and role consensus. The overall mean score for the total population indicates that such occurrences either did not occur or occurred less than once a month. A possible reason for this finding is the nature of military organizations; that is, orders are followed and disagreements or disputes are not considered an option to be exercised.

Question 15. Should disagreements or disputes occur, how well such differences are resolved, presumably by the GEOCOM, is measured by this question. Overall mean score results reveal that most commands perceive these differences as being resolved on a slightly less than adequate basis. However, a number of individual commands had higher mean scores indicating a more favorable perception in this matter.

Question 16. Another measure of quality of relationship, this question measures the extent to which the echelon four activity feels it might have been hindered by GEOCOM staff in performing its mission. Results reveal that, overall, commands were hindered to little or no extent in performing their mission; a favorable measure.

Question 17. This question measures an organization's perception of how much it values the services of another organization. Specifically, in the case of this study, how important is the GEOCOM in the echelon four activity attaining its

goals? In almost all cases, the GEOCOM was considered less than somewhat important in the attainment of command goals. In all commands, the mean score leaned to the less favorable end of the Likert scale. As with some other measures, this perceived lack of need for GEOCOM services poses a threat to its continued existence or survival.

Questions 18, 19, and 20. These three questions are designed to assess the perceived effectiveness of the interorganizational relationship. Specifically, they measure the extent to which an organization perceives the other organization as carrying out its commitments and whether or not the relationship is viewed as being worthwhile, productive and satisfying. Overall population mean values for all three questions lean toward the less favorable end of the Likert scale. Overall, commands were satisfied with the interorganizational relationship to some extent, found the relationship worthwhile to a lesser extent, and found the relationship productive to the least extent. Thus, commands may be moderately satisfied with the relationship itself, but still perceive no real benefits from the arrangement.

Question 21. General impact of the GEOCOM upon the services or operations of the echelon four activities is assessed with this question. The overall population mean value shows that the GEOCOM in general, has changed or influenced the services or operations of echelon four activities to some extent. Whether that influence is positive or negative was not assessed; only the fact that commands are influenced.

Analysis of Variance (ANOVA) Results

Application of the ANOVA model to the data set for each question resulted in the rejection of the null hypothesis (that there is no difference among echelon four commands concerning interorganizational relations with the GEOCOM) in 14 of the 30 questions. Tukey's honestly significant difference test was applied to each of these 14 questions to indicate which commands account for the resulting differences. Figures 8 through 21 are found in appendix C and present a histogram of all responses by command, the ANOVA table, and the Tukey test results for each of the 14 questions. Findings are as follows:

Question 2a. The null hypothesis is rejected with a p-value of .0131. Tukey's test reveals that the greatest difference (.05 significance) is found between Naval Hospital Great Lakes and Naval Dental Clinic Great Lakes (see figure 8). Of all commands, Naval Hospital Great Lakes agrees least with the GEOCOM concerning command priorities, and Dental Clinic Great Lakes agrees most with the GEOCOM.

Question 2b. The null hypothesis is rejected with a p-value of .0210. Tukey's test reveals that overall, the greatest differences are found between Naval Hospital Great Lakes and Naval Dental Clinic Great Lakes (.05 significance), and between Naval Hospital Newport and Naval Dental Clinic Great Lakes (.10 significance) (see figure 9). Of all commands, Naval Hospital Great Lakes and Naval Hospital Newport agree least with the GEOCOM concerning the methods in which work is accomplished, and Naval Dental Clinic Great Lakes agrees most with the GEOCOM.

Question 3a. The null hypothesis is rejected with a p-value of .0335. Tukey's test reveals that the greatest difference (.10 significance) is found between Naval Hospital Great Lakes and Naval Dental Clinic Great Lakes (see figure 10). Of all commands, Naval Hospital Great Lakes has the least perception of involvement with the GEOCOM in receiving or sending resources (money, personnel, equipment, office space) and Naval Dental Clinic Great Lakes has the greatest perception of such involvement with the GEOCOM.

Question 7a. The null hypothesis is rejected with a p-value of .0297. Tukey's test reveals that overall, the greatest differences are found between Naval Hospital Great Lakes and Naval Dental Clinic Newport (.05 significance), and between Naval Hospital Groton and Naval Dental Clinic Great Newport (.10 significance) (see figure 11). Of all commands, Naval Hospital Great Lakes and Naval Hospital Groton communicate with the GEOCOM by way of written letter, memos, or reports to the least extent, and Naval Dental Clinic Newport communicates with the GEOCOM in this fashion to the greatest extent.

Question 7b. The null hypothesis is rejected with a p-value of .0014. Tukey's test reveals that overall, the greatest differences are found between Naval Hospital Groton and Naval Hospital Great Lakes (.10 significance), and between Naval Dental Clinic Great Lakes and four other commands: Naval Hospital Groton (.01 significance), Naval Hospital Newport (.05 significance), Naval Dental Clinic Philadelphia (.05 significance), and Naval Medical Clinic Portsmouth (.10 significance) (see figure 12). Of

all commands, Naval Hospital Groton communicates with the GEOCOM by way of personal face-to-face discussion to the least extent, and Naval Dental Clinic Great Lakes communicates with the GEOCOM in this fashion to the greatest extent. Naval Dental Clinic Great Lakes close proximity to the GEOCOM headquarters may account for this phenomenon.

Question 7d. The null hypothesis is rejected with a p-value of .0269. Tukey's test reveals that overall, the greatest differences are found between Naval Dental Clinic Great Lakes and both Naval Hospital Great Lakes and Naval Hospital Newport (.05 significance) (see figure 13). Of all commands, Naval Hospital Great Lakes and Naval Hospital Newport communicate with the GEOCOM by way of group or committee meetings least extent, and Naval Dental Clinic Great Lakes communicates with the GEOCOM in this fashion to the greatest extent. It should be noted that means scores for all commands for this question were quite low, indicating that even Naval Dental Clinic Great Lakes rarely uses this method to communicate the GEOCOM.

Question 11a. The null hypothesis is rejected with a p-value of .0067. Tukey's test reveals that overall, the greatest differences are found between Naval Dental Clinic Philadelphia and both Naval Hospital Great Lakes (.05 significance) and Naval Hospital Groton (.10 significance) (see figure 14). Of all commands, Naval Hospital Great Lakes and Naval Hospital Groton spends the least amount of working hours on matters directly related to the operations, work , or projects of the GEOCOM, and Naval Dental Clinic Philadelphia spends the most amount of working

hours.

Question 11b. The null hypothesis is rejected with a p-value of .0042. Since this question is very similar to question 11a, it is no surprise that the results of Tukey's test are identical. As with question 11a, the greatest differences are found between Naval Dental Clinic Philadelphia and both Naval Hospital Great Lakes. The level of significance, however was greater at .01 (see figure 15). Of all commands, Naval Hospital Great Lakes and Naval Hospital Groton spends the least amount of working hours on matters resulting from GEOCOM taskings, and Naval Dental Clinic Philadelphia spends the most amount of working hours on such taskings.

Question 13. The null hypothesis is rejected with a p-value of .0142. Tukey's test reveals that overall, the greatest differences are found between Naval Hospital Great Lakes and both Naval Hospital Groton (.10 significance) and Naval Hospital Newport (.05 significance) (see figure 16). Of all commands, when occurring, Naval Hospital Great Lakes experiences the greatest frequency of disagreements and disputes with the GEOCOM. However, it should be noted that the occurrence of such situations are minimal for all commands (see table 5).

Question 17. The null hypothesis is rejected with a p-value of .0091. Tukey's test reveals that overall, the greatest differences are found between Naval Dental Clinic Great Lakes and five other commands: Naval Hospital Great Lakes (.05 significance), Naval Hospital Groton (.01 significance), Naval Hospital Newport (.10 significance), Naval Dental Clinic

Philadelphia (.10 significance), and Naval Dental Clinic Newport (.10 significance) (see figure 17). It is quite notable that of all commands, Naval Dental Clinic Great Lakes has the highest regard for how important the GEOCOM is in attaining command goals, so much so, that it is set apart from much of the rest of the regional commands. Equally important is the reverse phenomenon, that is, of all commands, only one stands out as perceiving, as quite important, the services of the GEOCOM in attaining its goals.

Question 18. The null hypothesis is rejected with a p-value of .0271. Since this question is very similar to question 17, the results of Tukey's test are almost identical. The greatest differences are found between Naval Dental Clinic Great Lakes and the same five commands identified in question 17, plus the addition of Naval Hospital Philadelphia at a significance level of .10. The levels of significance, however, between Naval Dental Clinic Great Lakes and the five commands identified above, are different and can be found in figure 18). Once again, as with the results found in question 17, Naval Dental Clinic Great Lakes is set apart from much of the rest of the commands in this area; perceiving, to a considerable extent, the interorganizational relationship as very productive.

Question 19. The null hypothesis is rejected with a p-value of .0193. The results of Tukey's test are identical to those found in question 17 with the exception of the level of significance for each difference (see figure 19). Once again, only Naval Dental CLinic Great Lakes stands out as perceiving, to

a considerable extent, the interorganizational relationship as very worthwhile.

Question 20. The null hypothesis is rejected with a p-value of .0000. The results of Tukey's test reveals that overall, the greatest differences are found between Naval Hospital Great Lakes and five other commands: Naval Hospital Philadelphia (.05 significance), Naval Hospital Groton (.10 significance), Naval Hospital Newport (.05 significance), Naval Dental Clinic Philadelphia (.05 significance), and Naval Dental Clinic Great Lakes (.01 significance) (see figure 20). A difference also is identified between Naval Dental Clinic Great Lakes and Naval Hospital Groton (.10 significance). Naval Hospital Great Lakes' dissatisfaction with the interorganizational relationship is significant enough to set it apart from all other commands. Naval Dental Clinic Great Lakes, on the other hand, stands out as being satisfied, to a very considerable extent, with the relationship.

Question 21. The null hypothesis is rejected with a p-value of .0396. Tukey's test reveals that the greatest difference among commands is found between Naval Hospital Great Lakes and Naval Hospital Groton (.10 significance) (see figure 21). Of all commands, Naval Hospital Groton perceives that the GEOCOM has changed or influenced its services or operation (positively or negatively) to the least extent.

Regression Analysis Results⁴

Application of the Stepwise Multiple Regression model identified those independent variables which account for the greatest amount of variation in the dependent variable of

interorganizational relations. Only two of the five independent variables included in the regression model were identified before the BMDP program reached a tolerance level insufficient for further stepping. Figure 22 (see appendix C) is actual output from the BMDP stepwise regression model and provides a summary of these two variables' effect on the dependent variable. This summary reveals that the independent variable of ratio of administrative staff explains almost 13% of the variance in interorganizational relations and that area or proximity of the command explains approximately 6% of the variance. Together, these two variables account for about 18% of the variance in the dependent variable. Although a great deal of variance is not accounted for in this model, it still provides an indication of the two strongest predictors (of the five tested) of interorganizational relations with the echelon four activities.

Computer output of the final step (2) in the stepwise regression procedure is provided in figure 23 and identifies beta coefficients for the ratio and area variables (see appendix C). For the ratio variable, $\beta = -.38$, a fairly strong predictor of interorganizational relations. For the area variable, $\beta = .12$, a somewhat weaker predictor of the dependent variable. Thus, the smaller the ratio of administrative staff at the echelon four command to GEOCOM staff, the more favorable or positive the interorganizational relationship. To a somewhat lesser extent, commands which are based in the local proximity of the GEOCOM headquarters should experience a more favorable or positive level of interorganizational relations.

A review of the ANOVA results, however, reveals a discrepancy concerning the effectiveness of the area variable as a predictor. While Naval Hospital Great Lakes often appears to experience poor relations with the GEOCOM, Naval Dental Clinic Great Lakes appears to experience excellent interorganizational relations in many of the same instances. Two explanations are offered as possible reasons for this phenomenon. First, it is possible that the strength of the ratio variable overshadows the effect of the area variable. Naval Dental Clinic Great Lakes is a small command whose ratio is .13 versus a ratio value of .81 for Naval Hospital Great Lakes. Thus the effect of lower ratio cancels out the negative effect of local proximity to the GEOCOM headquarters. A second explanation involves the manner in which the variable of area is coded or identified by the computer. Those commands sharing physical location with the GEOCOM headquarters are coded "1" while those outside the proximate headquarters area are coded "0." This range of values are binary in nature, yet are treated by the computer as interval data. This treatment by the computer may indeed, be the source of this discrepancy in the regression results. In summary, while the ratio variable appears to be a valid predictor of interorganizational relations, the variable of area, while not ignoring the implications of its effect, should be treated cautiously when used as a predictor.

All other independent variables of the regression model, concurrence of respondent corps with GEOCOM Commander corps, respondent's own corps, and rank/paygrade of respondent, did not appear to act as predictors of interorganizational relations.

Endnotes

¹ Although inferential statistics are undertaken in this study, it should be noted that the respondent population could be viewed as just that; a population and not a sample. This population is well defined by criteria set forth in the initial stages of the study. As such, differences found among groups and variations in data analyses may stand by themselves and do not require evaluation with respect to sample variability. Nevertheless, inferential statistics are used in order to provide a common structural framework for future research potential.

² Questions in the survey instrument which ask the respondent to provide percentages were converted to the Likert scale using the following breakdown.

<u>Percentage</u>	<u>Likert Scale Equivalent</u>
0 - 19%	1
20 - 39%	2
40 - 59%	3
60 - 79%	4
80 - 100%	5

³ Questions # 14a, b, c, and d were removed from the data set after all survey instruments were returned. The majority of respondents appeared unable to accurately answer this set of questions most likely since they were too specific nature in nature. This accounts for a skip in number sequence in some statistical tables presented at a later point in this report.

⁴ In applying the regression model using the BMPD statistical software package, where respondents failed to answer a question, the mean value for the entire remaining respondents (N=105 minus number of respondents failing to answer) was substituted for the missing value.

V. Conclusion

In order to judge the effectiveness of communications, command and control within the Naval Medical Command Northeast Region, an assessment must be made concerning a number of aspects of the interorganizational relationship with its subordinate commands. This study has examined these aspects and as such, a number of conclusions are offered.

General Observations

A review of overall mean scores concerning a number of characteristics of interorganizational relations reveals some favorable and not so favorable findings. These general findings, for the overall respondent population are summarized as follows:

Positive Aspects of the Relationship

1. There is a higher than average level of awareness concerning goals and responsibilities of the GEOCOM.
2. There is general agreement on the issue of command priorities and methods used to accomplish tasks.
3. There is a high frequency of communication with all activities.
4. The majority of information flow occurs by use of telephone vs. the more timely and burdensome use of written communications or group or committee meetings. This also indicates efforts to reduce administrative paperwork and speed up the communication process.
5. There is a high level of clarity of communication with the echelon four command.

6. Little or no difficulty is experienced when trying to pass information to the GEOCOM.
7. Disagreements or disputes between the GEOCOM and the echelon four commands rarely occur.
8. Commands are rarely hindered by the GEOCOM in performing their mission.

Negative Aspects of the Relationship

1. Commands feel they can accomplish their goals and responsibilities with little or no help from the GEOCOM.
2. There is little reliance on subformal means of communications indicating a greater reliance on official edicts and possibly less candid expression of information (Downs, 1967).
3. Commands perceive a lack of dissemination concerning the terms of the interorganizational relationship. This would indicate the presence of role conflict.
4. Perhaps most significant, the echelon four commands generally do not value the services of the GEOCOM do not find the relationship with the GEOCOM worthwhile or productive, and, are not satisfied with the relationship.

Specific Relationships With Selected Commands

While a general observation of the total respondent populations gives insight into various aspects of the interorganizational relationship, it fails to identify those commands which differ from the overall group. The results of the ANOVA revealed some commands which stand out as being unique in a

number of aspects of the relationship.

Naval Hospital Great Lakes, without a doubt, has experienced the least favorable level of interorganizational relations with the GEOCOM. This phenomenon is obvious in many areas as well as the level to which many of its responses differ from the majority of the other subordinate commands. This poor relationship is evident in such areas as disagreement as to the priorities of the command, disagreement concerning the methods used to accomplish its goals and responsibilities, frequency of disagreements or disputes when interacting with the GEOCOM, perception of value of GEOCOM services, how productive and worthwhile is the relationship, and finally, the level of satisfaction with the relationship. In this last area, satisfaction with the relationship, Naval Hospital Great Lakes is significantly set apart from all other echelon four commands.

The most positive level of interorganizational relations appears to exist with Naval Dental Clinic Great Lakes. Of the fourteen questions examined as part of the ANOVA, ten are of a sensitive nature concerning the relationship. In seven of these questions, Naval Dental Clinic stands out from most other commands as experiencing the most positive level of interorganizational relationships.

Finally, Naval Hospital Groton stands out in a number of areas, particularly those which measure the level of interaction with the GEOCOM and those which indicate the general affect the GEOCOM has on commands. For example, ANOVA results reveal that Naval Hospital Groton communicates least of all commands by

written tool, communicates least of all commands by face-to-face interactions, spends the least amount of time on GEOCOM matters and taskings, experiences the lowest frequency of disputes or disagreements, and perceives the GEOCOM as having little or no influence on its operations or services. These results do not necessarily point to a positive or negative relationship with the GEOCOM, however, it may point to a lack of communication or structure between the two organizations and may very well warrant further investigation.

Predictors of Interorganizational Relations

Rank and corps do not appear to be adequate predictors of interorganizational relations as indicated in the regression model results. In the area of corps, this is surprising, especially in light of the fact that corps in this study relates to a variety of medical professionals, all with strong loyalties to their chosen field, military corps, and past experiences. It appears, however, that in the military medical environment, or perhaps in dealing with an external, higher military authority, such perceptions and attitudes concerning the relationship with the GEOCOM cuts across all corps lines.

The variable of ratio is obviously a strong predictor of the relationship. This finding is supported by the poor relationship that exists between Naval Hospital Great Lakes and the GEOCOM.

Specific Recommendations

Recommendation 1. The Naval Medical Command Northeast Region should examine and attempt to address the negative aspects of the

relationship, indicated as a result of the general observations.

Recommendation 2. Ways to convince the echelon four commands of the value of the GEOCOM's services or functions must be found. Such strategies should not be designed to increase a command's dependence on the GEOCOM, but should have as its goal, methods to enhance the echelon four activity's operation. Each activity should be asked what kind of GEOCOM services or support they perceive as valuable, whether currently performed or not. Creative endeavors, such as an innovation branch, designed to meet these needs, should not be discredited.

Recommendation 3. Although ratio of size of administrative staff cannot be easily changed, greater attention to fostering a positive relationship with larger commands is advisable. Concerning Naval Hospital Great Lakes, supportive, positive action is recommended. All negative aspects of the relationship should be examined, addressed, and periodically assessed. Some of these negative aspects of the relationship apply to all commands and are not unique to Naval Hospital Great Lakes. However, an even greater effort may be required in addressing this situation at this command.

Recommendation 4. Further research is recommended in this area of interorganizational relations. Other regional commands should be surveyed, especially since not all regional commands function in the same manner, have the same structure, or the same goals. Additional research is also indicated to assess the effect of Commanding Officers on the perceptions of command personnel concerning relations with the GEOCOMs. A number of researchers

have suggested that attitudes and perceptions of an organization are a reflection of its top managers (Schein, 1986; Hambrick & Mason, 1984). Such a project would entail surveying Medical Department Commanding Officers, nationwide. However, an extensive amount of bias could occur since Commanding Officers are not always willing to give a candid assessment of higher-level commands for fear of retribution. Nevertheless, further research in this area could provide significant insight into the nature of interorganizational relations between the GEOCOMs and their subordinate commands.

Appendix A

Naval Medical Command Northeast Region



INTERORGANIZATIONAL RELATIONS SURVEY

Dear Respondent,

As a key member of the management team at this command, you have been selected to complete a survey designed to solicit perceptions on the quality of the relationship between your command and the Navy Medical Command Northeast Region. This is part of a graduate research project which will be submitted to the U.S. Army-Baylor University Graduate Program in Health Care Administration. The survey consists of two parts; an introductory questionnaire designed to acquire demographic information and a questionnaire consisting of twenty-one statements or statement groups. These statements relate to the context, design, and outcome of the relationship between your command and the GEOCOM.

Please take a few minutes to complete the survey. You are asked to do this privately and not in consultation with other personnel at your command. In order for the results to have relevance, your unbiased input is required.

The information resulting from the analyses of the survey data can lead to a better understanding of the nature of communications/relations between GEOCOMS and echelon four commands, identification of underlying factors influencing these relations, and possible steps to improve our Navy Medical Department organizational structure.

Let me assure you that all responses will be treated confidentially and that anonymity will be observed in all reported results. Should you have questions regarding this survey or any aspect of this study, do not hesitate to call my point of contact, LT D. Krieger, MSC, USN, at Commercial 312-688-2914/5 or Autovon 792-2914/5.

Thank you for your time. Your help is most appreciated.

R. K. Zentmyer
Captain
Medical Service Corps
United States Navy
Commander

INTRODUCTORY QUESTIONS

Responses to the following questions will assist in properly coding and analyzing the data. Your responses will be kept strictly confidential.

1. Name of present COMMAND for which you work: ()

2. How long have you been assigned to this command?
() Years, () Months.

3. Your DESIGNATOR? ()
NOTE: Enter NA if enlisted or civilian.

4. Designator/Corps of your GEOCOM Commander? ()

5. Your Rank/Rate/Civilian Pay Grade? Check one.

O-5/O-6: () GS-11 or above: () E-8/E-9: ()

O-3/O-4: () GS-9: () E-7: ()

O-1/O-2: ()

6. How aware are you of the GEOCOM's involvement in your command's activities?

Very Aware: () Somewhat Aware: () Unaware: ()

7. If aware of the GEOCOM's involvement, have you have formed opinions concerning the level of communications, command and control between your command and the GEOCOM?

Yes: () No: () Not Applicable: ()

SURVEY QUESTIONNAIRE

The following questions relate to your perspective on interorganizational relations with your respective GEOCOM. In the space provided after each question, enter the number from the answer scale that reflects your most accurate answer to each question.

1. How well informed are you about the specific goals and responsibilities of the GEOCOM? (_____)

NOT AT ALL	LITTLE INFORMED	SOMEWHAT INFORMED	QUITE INFORMED	VERY WELL INFORMED
1	2	3	4	5

2. In your opinion, how much do you and the GEOCOM agree or disagree on:

- a. The priorities of your command or department? (_____)
- b. The specific methods by which work is accomplished or services are provided by your command or department? (_____)

DON'T KNOW	DISAGREE MUCH	AGREE A LITTLE	AGREE SOMEWHAT	AGREE QUITE A BIT	AGREE VERY MUCH
0	1	2	3	4	5

3. During the past six months, how much was your command or department involved with the GEOCOM for each of the following reasons:

- a. To receive or send resources (money, personnel, equipment, office space)? (_____)
- b. To receive or send technical assistance (consultation or staff services in functional areas)? (_____)
- c. To receive or send information for purposes of coordination, control, planning or evaluation? (_____)

DONT KNOW	NOT AT ALL	VERY LITTLE	SOME- WHAT	QUITE A BIT	VERY MUCH
0	1	2	3	4	5

4. For your command or department to accomplish its goals and responsibilities, how much do you need the **services, resources, or support** from the GEOCOM? ()

NOT AT ALL	VERY LITTLE	SOME- WHAT	QUITE A BIT	VERY MUCH
1	2	3	4	5

5. In your opinion, to what extent have the terms of the **relationship** between your command and the GEOCOM:

- a. Been explicitly **verbalized or discussed**? ()
- b. Been **written down in detail**? ()

DONT KNOW	TO NO EXTENT	LITTLE EXTENT	SOME EXTENT	CONSIDERABLE EXTENT	GREAT EXTENT
0	1	2	3	4	5

6. During the past six months, how **frequently** have you or the personnel you work with **communicated or been in contact** with staff at the GEOCOM? ()

NOT ONCE	1-2 TIMES	ABOUT MONTHLY	ABOUT EVERY 2 WEEKS	ABOUT WEEKLY	ABOUT DAILY	MANY TIMES DAILY
0	1	2	3	4	5	6

7. How **frequently** have you or the personnel you work with **communicated** with staff at the GEOCOM through each of the following ways, in the past six months:

- a. Through **written letters, memos, or reports**? ()
- b. Through **personal face-to-face discussions**? ()
- c. Through **telephone calls**? ()
- d. Through **group or committee meetings** between three or more personnel from your command and the GEOCOM?
()

NOT ONCE	1-2 TIMES	ABOUT MONTHLY	ABOUT EVERY 2 WEEKS	ABOUT WEEKLY	ABOUT DAILY	MANY TIMES DAILY
0	1	2	3	4	5	6

8. In general, what percent of all these communications with the GEOCOM were initiated by you or the personnel you work with during the past six months? (Indicate percent.) (____%)

9. When you want to communicate with GEOCOM staff members, how much difficulty have you had in reaching them? (____)

NO CONTACT	NONE	LITTLE	SOME	QUITE A BIT	VERY MUCH
0	1	2	3	4	5

10. How often are you misunderstood, if at all, when communicating with GEOCOM staff members? (____)

NO CONTACT	NEVER	RARELY	FREQUENTLY	MOST OF THE TIME	ALWAYS
0	1	2	3	4	5

11. During the past six months:

- What percent of your total working hours were spent on matters directly related to the operations, work, or projects of the GEOCOM? (Indicate percent.) (____%)
- What percent of all the work accomplished by you or your department resulted from GEOCOM taskings? (Indicate percent.) (____%)
- What percent of all technical assistance and services did you receive from the GEOCOM? (Indicate percent.) (____%)

12. Regarding coordination of activities with the GEOCOM during the past six months, to what extent do you feel:

- Standard operating procedures have been established (e.g., rules, policies, forms, etc.)? (____)
- Formal communication channels were followed? (____)

TO NO EXTENT	LITTLE EXTENT	SOME EXTENT	CONSIDERABLE EXTENT	GREAT EXTENT
1	2	3	4	5

13. During the past six months, did disagreements or disputes between you or the personnel you work with and the GEOCOM occur and if so, how often? ()

DID NOT OCCUR	ABOUT ONCE A MONTH	ABOUT EVERY 2 WEEKS	ABOUT ONCE A WEEK	SEVERAL TIMES A WEEK	EVERY DAY
1 **	2	3	4	5	6

**If disagreements or disputes did not occur, skip to question number 16.

14. When disagreements or disputes occurred, how often were they handled in each of the following ways during the past six months?

- By ignoring or avoiding the issues? ()
- By smoothing over the issues? ()
- By bringing the issues out in the open and working them out among the parties involved? ()
- By having a higher level manager or authority resolve the issues between the parties involved? ()

ALMOST NEVER	SELDOM	ABOUT HALF THE TIME	OFTEN	ALMOST ALWAYS
1	2	3	4	5

15. How well are differences worked out at this time between your command and the GEOCOM? ()

VERY POORLY	POORLY	ADEQUATELY	QUITE WELL	VERY WELL
1	2	3	4	5

16. During the past six months did GEOCOM staff members hinder your department in performing its mission and if so, to what extent? ()

DID NOT HINDER	LITTLE EXTENT	SOME EXTENT	CONSID- ERABLE EXTENT	GREAT EXTENT
1	2	3	4	5

17. Overall, how important was the GEOCOM in attaining the goals of your command or department during the past six months?
()

NOT VERY IMPORTANT	SOMEWHAT IMPORTANT	QUITE IMPORTANT	VERY IMPORTANT	ABSOLUTELY IMPORTANT
1	2	3	4	5

PLEASE ANSWER QUESTIONS #18-21 USING THE FOLLOWING SCALE:

TO NO EXTENT	LITTLE EXTENT	SOME EXTENT	CONSIDERABLE EXTENT	GREAT EXTENT
1	2	3	4	5

18. In your opinion, to what extent do you feel the relationship between your command and the GEOCOM is **productive** for your command or for the Navy Medical Department? ()

19. In your opinion, to what extent is the time and effort spent in developing and maintaining the relationship with the GEOCOM **worthwhile** to you, your command, or the Navy Medical Department?
()

20. To what extent are you **satisfied with the relationship** between your command and the GEOCOM during the past six months?
()

21. In your opinion, during the past six months, to what extent has the GEOCOM **changed or influenced** the services or operations of your command (whether positively or negatively)? ()

Appendix B

DEFINITION/CATEGORIES OF STUDY VARIABLES

1. Respondent Military Rank or Civilian Paygrade. Six categories are utilized in determining respondent rank or paygrade as follows:

- i. O-5/O-6 (Commander/Captain)
- ii. O-3/O-4 (Lieutenant/Lieutenant Commander)
- iii. O-1/O-2 (Ensign/Lieutenant Junior Grade)
- iv. GS-11/E-8/E-9 (Civilian/Senior Chief/Master Chief)
- v. GS-9/E-7 (Civilian/Chief Petty Officer)
- vi. Other (junior to the above categories)

2. Respondent Corps. Five categories are identified as follows:

- i. Medical Service Corps (MSC)
- ii. Medical Corps (MC)
- iii. Dental Corps (DC)
- iv. Nurse Corps (NC)
- v. Other: Enlisted, Civilian and other Officer Respondents

3. Corps of GEOCOM Commander:

Medical Service Corps

4. Location of Echelon Four Activity.

Located within proximate area of GEOCOM headquarters:

Naval Hospital Great Lakes
Naval Dental Clinic Great Lakes

Located outside proximate area of GEOCOM headquarters:

Naval Hospital Philadelphia
Naval Hospital Groton
Naval Hospital Newport
Naval Medical Clinic Portsmouth
Naval Dental Clinic Philadelphia
Naval Dental Clinic Newport

5. Ratio of Administrative Staffs. To calculate the ratio of size of administrative staffs at each echelon four command to region staff it was determined that the number of individuals at the GEOCOM headquarters who interact directly with personnel at the echelon four activities is 72. This number was divided into the number of personnel at each command identified as appropriate to receive the survey. The resulting ratios are as follows:

APPENDIX B (continued)

Naval Hospital Great Lakes: $58/72 = .81$
Naval Hospital Philadelphia: $24/72 = .33$
Naval Hospital Groton: $21/72 = .29$
Naval Hospital Newport: $19/72 = .26$
Naval Dental Clinic Philadelphia: $14/72 = .19$
Naval Medical Clinic Portsmouth: $10/72 = .14$
Naval Dental Clinic Great Lakes: $9/72 = .13$
Naval Dental Clinic Newport: $5/72 = .07$

TABLE STUDENTIZED RANGE TESTS

GROUP	YEAR	FIELD	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS	ANALYSIS
1. 1981	1981	1981	1981	1981	1981	1981	1981	1981	1981
2. 1982	1982	1982	1982	1982	1982	1982	1982	1982	1982
3. 1983	1983	1983	1983	1983	1983	1983	1983	1983	1983
4. 1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
5. 1985	1985	1985	1985	1985	1985	1985	1985	1985	1985
6. 1986	1986	1986	1986	1986	1986	1986	1986	1986	1986
7. 1987	1987	1987	1987	1987	1987	1987	1987	1987	1987
8. 1988	1988	1988	1988	1988	1988	1988	1988	1988	1988
9. 1989	1989	1989	1989	1989	1989	1989	1989	1989	1989
10. 1990	1990	1990	1990	1990	1990	1990	1990	1990	1990

DEPENDENCE

1. SIGNIFICANCE ***

2. SIGNIFICANCE **

3. SIGNIFICANCE *

4. SIGNIFICANCE

Figure 8. (continued)

HISTOGRAM OF * Q2B * * * * *

MEAN	STD. DEV.	MIN.	MAX.	Q1	Q3	Q2	Q4
5.000							
5.100							
5.200							
5.300							
5.400							
5.500							
5.600							
5.700							
5.800							
5.900							
6.000							
6.100							
6.200							
6.300							
6.400							
6.500							
6.600							
6.700							
6.800							
6.900							
7.000							
7.100							
7.200							
7.300							
7.400							
7.500							
7.600							
7.700							
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7.900							
8.000							
8.100							
8.200							
8.300							
8.400							
8.500							
8.600							
8.700							
8.800							
8.900							
9.000							
9.100							
9.200							
9.300							
9.400							
9.500							
9.600							
9.700							
9.800							
9.900							
10.000							

MEAN AND STANDARD DEVIATION OF THE SAMPLES WITH * Q2B * INTERVIEW

MEAN	STD. DEV.	MIN.	MAX.	Q1	Q3	Q2	Q4
5.000							
5.100							
5.200							
5.300							
5.400							
5.500							
5.600							
5.700							
5.800							
5.900							
6.000							
6.100							
6.200							
6.300							
6.400							
6.500							
6.600							
6.700							
6.800							
6.900							
7.000							
7.100							
7.200							
7.300							
7.400							
7.500							
7.600							
7.700							
7.800							
7.900							
8.000							
8.100							
8.200							
8.300							
8.400							
8.500							
8.600							
8.700							
8.800							
8.900							
9.000							
9.100							
9.200							
9.300							
9.400							
9.500							
9.600							
9.700							
9.800							
9.900							
10.000							

ANALYSIS OF VARIANCE TABLE FOR Q2B

SOURCE	SS	DF	MS	F	SIG.
BETWEEN	1.111	2	.556	1.111	.344
WITHIN	1.111	18	.062		
TOTAL	2.222	20			

ANALYSIS OF VARIANCE TABLE FOR Q2B WITH ADJUSTED DEGREES OF FREEDOM

SOURCE	SS	DF	MS	F	SIG.
BETWEEN	1.111	2	.556	1.111	.344
WITHIN	1.111	18	.062		
TOTAL	2.222	20			

ANALYSIS OF VARIANCE TABLE FOR Q2B WITH ADJUSTED DEGREES OF FREEDOM

SOURCE	SS	DF	MS	F	SIG.
BETWEEN	1.111	2	.556	1.111	.344
WITHIN	1.111	18	.062		
TOTAL	2.222	20			

MEAN	STD. DEV.	MIN.	MAX.	Q1	Q3	Q2	Q4
5.000							
5.100							
5.200							
5.300							
5.400							
5.500							
5.600							
5.700							
5.800							
5.900							
6.000							
6.100							
6.200							
6.300							
6.400							
6.500							
6.600							
6.700							
6.800							
6.900							
7.000							
7.100							
7.200							
7.300							
7.400							
7.500							
7.600							
7.700							
7.800							
7.900							
8.000							
8.100							
8.200							
8.300							
8.400							
8.500							
8.600							
8.700							
8.800							
8.900							
9.000							
9.100							
9.200							
9.300							
9.400							
9.500							
9.600							
9.700							
9.800							
9.900							
10.000							

Figure 9. Histogram, ANOVA table, and Tukey's test results for question 2b.

TEST IDENTIFIED RANK METHOD

GROUP	MEAN	STDEV	MEAN	STDEV	MEAN	STDEV	MEAN	STDEV
NO. CASES	MEAN	STDEV	MEAN	STDEV	MEAN	STDEV	MEAN	STDEV
1. WHOLE	1.00	1.00						
2. WHOLE	1.00	1.00						
3. WHOLE	1.00	1.00						
4. WHOLE	1.00	1.00						
5. WHOLE	1.00	1.00						
6. WHOLE	1.00	1.00						
7. WHOLE	1.00	1.00						
8. WHOLE	1.00	1.00						
9. WHOLE	1.00	1.00						
10. WHOLE	1.00	1.00						
11. WHOLE	1.00	1.00						
12. WHOLE	1.00	1.00						
13. WHOLE	1.00	1.00						
14. WHOLE	1.00	1.00						
15. WHOLE	1.00	1.00						
16. WHOLE	1.00	1.00						
17. WHOLE	1.00	1.00						
18. WHOLE	1.00	1.00						
19. WHOLE	1.00	1.00						
20. WHOLE	1.00	1.00						

CONVERTED
 TO
 DIFFERENCE ***
 TO DIFFERENCE **
 TO DIFFERENCE *
 TO DIFFERENCE

Figure 9. (continued).

TUXEN ET AL. (1972) RANKS METHOD

GROUP	SEX	NO. OF INDIVIDUALS	NO. OF INDIVIDUALS	NO. OF INDIVIDUALS	NO. OF INDIVIDUALS	NO. OF INDIVIDUALS	NO. OF INDIVIDUALS
NO. LABEL	MEAN	SIZE					
1. N-1000000	0.00	12					
2. N-1000000	0.00	12					
3. N-1000000	0.00	12					
4. N-1000000	0.00	12					
5. N-1000000	0.00	12					
6. N-1000000	0.00	12					
7. N-1000000	0.00	12					
8. N-1000000	0.00	12					

NO. OF INDIVIDUALS

 10. SIGNIFICANCE ***
 20. SIGNIFICANCE **
 30. SIGNIFICANCE *
 40. SIGNIFICANCE

Figure 10. (continued).

TUMER STUDENTIZED RANGE METHOD

BRIEF	SAMPLE	N-BLANK	N-R-1A	N-BRITON	N-WAT	NOR-12	PORTENT	DISLAVE	NO. OF
NO. LABEL	MEAN	EDGE							
1 N-BLANK	1.00	74							
2 N-R-1A	1.07	15							
3 N-BRITON	0.84	15							
4 N-WAT	1.04	12							
5 NOR-12	1.07	9							
6 PORTENT	1.07	8							
7 DISLAVE	1.00	8							
8 NO. OF	1.00	8	**	*					

SIGNIFICANCE

1% SIGNIFICANCE ***
 5% SIGNIFICANCE **
 10% SIGNIFICANCE *
 NO SIGNIFICANCE

Figure 11. (continued).

TUKEY STUDENTIZED RANGE METHOD

GROUP	SAMPLE	MEAN	SIZE	1-N-BLAKES	1-N-PHILA	1-N-ROTON	1-N-WPT	1-N-PHILA	1-N-ROTON	1-N-BLAKES	1-N-WPT
NO. LABEL											
1 1-N-BLAKES	1.88	34									
2 1-N-PHILA	1.81	18									
3 1-N-ROTON	1.78	16	*								
4 1-N-WPT	1.70	17									
5 1-N-PHILA	1.11	8									
6 1-N-ROTON	1.17	8									
7 1-N-BLAKES	0.17	8									
8 1-N-WPT	0.17	8									

MEAN DIFFERENCE
 1. SIGNIFICANCE ***
 2. SIGNIFICANCE **
 3. SIGNIFICANCE *
 4. SIGNIFICANCE

Figure 12. (continued).

TUNNEY STUDENTIZED RANGE METHOD

GROUP	SAMPLE	MEAN	SIZE	ADOLAKES	NHPHILA	N-GRSTON	NHAWPT	ADDF-OLA	NHPTSTPT	ADBL-LE	NCONWPT
1	ADOLAKES	0.68	34								
2	NHPHILA	0.63	18								
3	N-GRSTON	0.73	16								
4	NHAWPT	0.47	14								
5	ADDF-OLA	0.61	7								
6	NHPTSTPT	0.67	6								
7	ADBL-LE	0.80	6	**			**				
8	NCONWPT	0.80	6								

SIGNIFICANCE

1%	SIGNIFICANCE	***
5%	SIGNIFICANCE	**
10%	SIGNIFICANCE	*
NO	SIGNIFICANCE	

Figure 13. (continued).

```

*****
-161068A* 1F 0 0014 + 05 000000 0A + 000000 +
*****

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[illegible]

PERCENT OF VOTERS BY RACE FOR YEAR		TOTAL	
WHITE	BLACK	PERCENT	NUMBER OF VOTERS
1960	1960	1960	1960
1961	1961	1961	1961
1962	1962	1962	1962
1963	1963	1963	1963
1964	1964	1964	1964
1965	1965	1965	1965
1966	1966	1966	1966
1967	1967	1967	1967
1968	1968	1968	1968
1969	1969	1969	1969
1970	1970	1970	1970
1971	1971	1971	1971
1972	1972	1972	1972
1973	1973	1973	1973
1974	1974	1974	1974
1975	1975	1975	1975
1976	1976	1976	1976
1977	1977	1977	1977
1978	1978	1978	1978
1979	1979	1979	1979
1980	1980	1980	1980
1981	1981	1981	1981
1982	1982	1982	1982
1983	1983	1983	1983
1984	1984	1984	1984
1985	1985	1985	1985
1986	1986	1986	1986
1987	1987	1987	1987
1988	1988	1988	1988
1989	1989	1989	1989
1990	1990	1990	1990
1991	1991	1991	1991
1992	1992	1992	1992
1993	1993	1993	1993
1994	1994	1994	1994
1995	1995	1995	1995
1996	1996	1996	1996
1997	1997	1997	1997
1998	1998	1998	1998
1999	1999	1999	1999
2000	2000	2000	2000
2001	2001	2001	2001
2002	2002	2002	2002
2003	2003	2003	2003
2004	2004	2004	2004
2005	2005	2005	2005
2006	2006	2006	2006
2007	2007	2007	2007
2008	2008	2008	2008
2009	2009	2009	2009
2010	2010	2010	2010
2011	2011	2011	2011
2012	2012	2012	2012
2013	2013	2013	2013
2014	2014	2014	2014
2015	2015	2015	2015
2016	2016	2016	2016
2017	2017	2017	2017
2018	2018	2018	2018
2019	2019	2019	2019
2020	2020	2020	2020
2021	2021	2021	2021
2022	2022	2022	2022
2023	2023	2023	2023
2024	2024	2024	2024
2025	2025	2025	2025
2026	2026	2026	2026
2027	2027	2027	2027
2028	2028	2028	2028
2029	2029	2029	2029
2030	2030	2030	2030
2031	2031	2031	2031
2032	2032	2032	2032
2033	2033	2033	2033
2034	2034	2034	2034
2035	2035	2035	2035
2036	2036	2036	2036
2037	2037	2037	2037
2038	2038	2038	2038
2039	2039	2039	2039
2040	2040	2040	2040
2041	2041	2041	2041
2042	2042	2042	2042
2043	2043	2043	2043
2044	2044	2044	2044
204			

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[illegible][illegible]

Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: a control group (n = 10) and an experimental group (n = 10). The control group received a placebo (PLA) and the experimental group received a 10% w/v alginate-chitosan hydrogel (ALG-CHI). The subjects were then subjected to a 10% w/v alginate-chitosan hydrogel (ALG-CHI) for 10 days. The subjects were then subjected to a 10% w/v alginate-chitosan hydrogel (ALG-CHI) for 10 days. The subjects were then subjected to a 10% w/v alginate-chitosan hydrogel (ALG-CHI) for 10 days.

[illegible]

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1971). The concentration of chlorophylls was expressed as $\mu\text{g mL}^{-1}$ of the sample.

[illegible][illegible]

85

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87

,

545

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Figure 15. (continued).

[illegible][illegible]

the 1990s, the number of people in the world who are illiterate has increased from 1.2 billion to 1.5 billion. The number of illiterate people in the world is expected to reach 1.7 billion by the year 2015. The number of illiterate people in the world is expected to reach 1.7 billion by the year 2015. The number of illiterate people in the world is expected to reach 1.7 billion by the year 2015.

Figure 16. Histogram, ANOVA, and Tukey's test results for question 13.

NO 4212 030

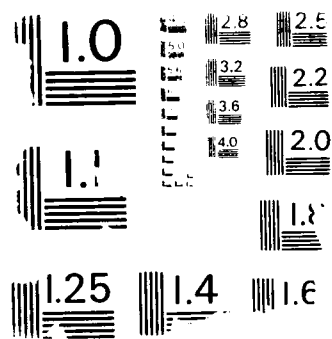
AN ASSESSMENT OF INTERORGANIZATIONAL RELATIONS BETWEEN 2/2
NAVY MEDICAL COMM. (U) ACADEMY OF HEALTH SCIENCES
(ARMY) FORT SAN HOUSTON TX HEALTHCC. D KRIEGER JUL 88

UNCLASSIFIED NCA-86-89

F/G 25/5

NL





INTERFERENCE-FLUX, RELATIVE

WAVELENGTH (nm)	INTERFERENCE-FLUX, RELATIVE	WAVELENGTH (nm)	INTERFERENCE-FLUX, RELATIVE
400	0.00	450	0.00
410	0.00	460	0.00
420	0.00	470	0.00
430	0.00	480	0.00
440	0.00	490	0.00
450	0.00	500	0.00
460	0.00	510	0.00
470	0.00	520	0.00
480	0.00	530	0.00
490	0.00	540	0.00
500	0.00	550	0.00
510	0.00	560	0.00
520	0.00	570	0.00
530	0.00	580	0.00
540	0.00	590	0.00
550	0.00	600	0.00
560	0.00	610	0.00
570	0.00	620	0.00
580	0.00	630	0.00
590	0.00	640	0.00
600	0.00	650	0.00
610	0.00	660	0.00
620	0.00	670	0.00
630	0.00	680	0.00
640	0.00	690	0.00
650	0.00	700	0.00
660	0.00	710	0.00
670	0.00	720	0.00
680	0.00	730	0.00
690	0.00	740	0.00
700	0.00	750	0.00
710	0.00	760	0.00
720	0.00	770	0.00
730	0.00	780	0.00
740	0.00	790	0.00
750	0.00	800	0.00
760	0.00	810	0.00
770	0.00	820	0.00
780	0.00	830	0.00
790	0.00	840	0.00
800	0.00	850	0.00
810	0.00	860	0.00
820	0.00	870	0.00
830	0.00	880	0.00
840	0.00	890	0.00
850	0.00	900	0.00
860	0.00	910	0.00
870	0.00	920	0.00
880	0.00	930	0.00
890	0.00	940	0.00
900	0.00	950	0.00
910	0.00	960	0.00
920	0.00	970	0.00
930	0.00	980	0.00
940	0.00	990	0.00
950	0.00	1000	0.00

INTERFERENCE-FLUX, RELATIVE

Figure 16. (continued).

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[illegible]

ANALYSIS OF VARIANCE TABLE FOR MEANS						TOTAL	
SOURCE	D.F.	SS	MS	F-VALUE	PROBABILITY	GRAND TOTAL	GRAND MEAN
TREATMENT	1	100.00	100.00	10.00	0.01	100.00	10.00
ERROR	9	90.00	10.00			90.00	10.00
TOTAL						100.00	10.00

91

7. BY IDENTIFIED RANGE METHOD

GROUP	SAMPLE	A-BLANCE	GR-FILA	A-FFITON	A-WFT	NDP-FILA	PORTENT	NDP-FILA	W-FITON
NO. LABEL	MEAN	SIZE							
1 A-BLANCE	1.74	14							
2 A-FFITON	2.10	14							
3 A-WFT	1.65	14							
4 A-WFT	1.67	14							
5 NDP-FILA	1.78	8							
6 A-PORTENT	2.11	8							
7 A-BLANCE	1.67	8	**	***	*	+			
8 A-WFT	1.61	8							

SIGNIFICANCE

14	SIGNIFICANCE	***
8	SIGNIFICANCE	**
10	SIGNIFICANCE	*
10	SIGNIFICANCE	

Figure 17. (continued).

TWO-STEP LOGRATIZED RANKS METHOD

GROUP	YEAR	SIZE	1945-46	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53
1. UNELABED	1945	14								
2. UNELABED	1946	15								
3. UNELABED	1947	16								
4. UNELABED	1948	17								
5. UNELABED	1949	18								
6. UNELABED	1950	19								
7. UNELABED	1951	20								
8. UNELABED	1952	21								
9. UNELABED	1953	22								
10. UNELABED	1954	23								
11. UNELABED	1955	24								
12. UNELABED	1956	25								
13. UNELABED	1957	26								
14. UNELABED	1958	27								
15. UNELABED	1959	28								
16. UNELABED	1960	29								
17. UNELABED	1961	30								
18. UNELABED	1962	31								
19. UNELABED	1963	32								
20. UNELABED	1964	33								
21. UNELABED	1965	34								
22. UNELABED	1966	35								
23. UNELABED	1967	36								
24. UNELABED	1968	37								
25. UNELABED	1969	38								
26. UNELABED	1970	39								
27. UNELABED	1971	40								
28. UNELABED	1972	41								
29. UNELABED	1973	42								
30. UNELABED	1974	43								
31. UNELABED	1975	44								
32. UNELABED	1976	45								
33. UNELABED	1977	46								
34. UNELABED	1978	47								
35. UNELABED	1979	48								
36. UNELABED	1980	49								
37. UNELABED	1981	50								
38. UNELABED	1982	51								
39. UNELABED	1983	52								
40. UNELABED	1984	53								
41. UNELABED	1985	54								
42. UNELABED	1986	55								
43. UNELABED	1987	56								
44. UNELABED	1988	57								
45. UNELABED	1989	58								
46. UNELABED	1990	59								
47. UNELABED	1991	60								
48. UNELABED	1992	61								
49. UNELABED	1993	62								
50. UNELABED	1994	63								
51. UNELABED	1995	64								
52. UNELABED	1996	65								
53. UNELABED	1997	66								
54. UNELABED	1998	67								
55. UNELABED	1999	68								
56. UNELABED	2000	69								
57. UNELABED	2001	70								
58. UNELABED	2002	71								
59. UNELABED	2003	72								
60. UNELABED	2004	73								
61. UNELABED	2005	74								
62. UNELABED	2006	75								
63. UNELABED	2007	76								
64. UNELABED	2008	77								
65. UNELABED	2009	78								
66. UNELABED	2010	79								
67. UNELABED	2011	80								
68. UNELABED	2012	81								
69. UNELABED	2013	82								
70. UNELABED	2014	83								
71. UNELABED	2015	84								
72. UNELABED	2016	85								
73. UNELABED	2017	86								
74. UNELABED	2018	87								
75. UNELABED	2019	88								
76. UNELABED	2020	89								
77. UNELABED	2021	90								
78. UNELABED	2022	91								
79. UNELABED	2023	92								
80. UNELABED	2024	93								
81. UNELABED	2025	94								
82. UNELABED	2026	95								
83. UNELABED	2027	96								
84. UNELABED	2028	97								
85. UNELABED	2029	98								
86. UNELABED	2030	99								
87. UNELABED	2031	100								
88. UNELABED	2032	101								
89. UNELABED	2033	102								
90. UNELABED	2034	103								
91. UNELABED	2035	104								
92. UNELABED	2036	105								
93. UNELABED	2037	106								
94. UNELABED	2038	107								
95. UNELABED	2039	108								
96. UNELABED	2040	109								
97. UNELABED	2041	110								
98. UNELABED	2042	111								
99. UNELABED	2043	112								
100. UNELABED	2044	113								
101. UNELABED	2045	114								
102. UNELABED	2046	115								
103. UNELABED	2047	116								
104. UNELABED	2048	117								
105. UNELABED	2049	118								
106. UNELABED	2050	119								
107. UNELABED	2051	120								
108. UNELABED	2052	121								
109. UNELABED	2053	122								
110. UNELABED	2054	123								
111. UNELABED	2055	124								
112. UNELABED	2056	125								
113. UNELABED	2057	126								
114. UNELABED	2058	127								
115. UNELABED	2059	128								
116. UNELABED	2060	129								
117. UNELABED	2061	130								
118. UNELABED	2062	131								
119. UNELABED	2063	132								
120. UNELABED	2064	133								
121. UNELABED	2065	134								
122. UNELABED	2066	135								
123. UNELABED	2067	136								
124. UNELABED	2068	137								
125. UNELABED	2069	138								
126. UNELABED	2070	139								
127. UNELABED	2071	140								
128. UNELABED	2072	141								
129. UNELABED	2073	142								
130. UNELABED	2074	143								
131. UNELABED	2075	144								
132. UNELABED	2076	145								
133. UNELABED	2077	146								
134. UNELABED	2078	147								
135. UNELABED	2079	148								
136. UNELABED	2080	149								
137. UNELABED	2081	150								
138. UNELABED	2082	151								
139. UNELABED	2083	152								
140. UNELABED	2084	153								
141. UNELABED	2085	154								
142. UNELABED	2086	155								
143. UNELABED	2087	156								
144. UNELABED	2088	157								
145. UNELABED	2089	158								
146. UNELABED	2090	159								
147. UNELABED	2091	160								
148. UNELABED	2092	161								
149. UNELABED	2093	162								
150. UNELABED	2094	163								
151. UNELABED	2095	164								
152. UNELABED	2096	165								
153. UNELABED	2097	166								
154. UNELABED	2098	167								
155. UNELABED	2099	168								
156. UNELABED	2100	169								
157. UNELABED	2101	170								
158. UNELABED	2102	171								
159. UNELABED	2103	172								
160. UNELABED	2104	173								
161. UNELABED	2105	174								
162. UNELABED	2106	175								
163. UNELABED	2107	176								
164. UNELABED	2108	177								
165. UNELABED	2109	178								
166. UNELABED	2110	179								
167. UNELABED	2111	180								
168. UNELABED	2112	181								
169. UNELABED	2113	182								
170. UNELABED	2114	183								
171. UNELABED	2115	184								
172. UNELABED	2116	185								
173. UNELABED	2117	186								
174. UNELABED	2118	187								
175. UNELABED	2119	188								
176. UNELABED	2120	189								
177. UNELABED	2121	190								
178. UNELABED	2122	191								
179. UNELABED	2123	192								
180. UNELABED	2124	193								
181. UNELABED	2125	194								
182. UNELABED	2126	195								

REFUGEE	APR-1968	MAY-1968	JUN-1968	JUL-1968	AUG-1968	SEP-1968	OCT-1968	NOV-1968
1. 10000								
2. 10000								
3. 10000	++							
4. 10000								
5. 10000								
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7. 10000	++++	++++		++				
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9. 10000								
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11. 10000	+++++	++	++	++	++	++		+
12. 10000								
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14. 10000								
15. 10000	+++++	++	++++	++	++	+		++
16. 10000								
17. 10000								
18. 10000								
19. 10000	++++	++		++				

[illegible]

ANALYSIS OF VARIANCE TABLE FOR MEANS					F-RATIO		F-RATIO	
SOURCE	DF	SS	MS	F-RATIO	PROBABILITY	MEAN	STDEV	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
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TOTAL	15	10.00						
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WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
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TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
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TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
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TOTAL	15	10.00						
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TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
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TOTAL	15	10.00						
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WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
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TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						
BETWEEN	3	7.50	2.50	1.54	0.25	2.50	1.54	
WITHIN	12	2.50	0.21			0.21	0.46	
TOTAL	15	10.00						

95

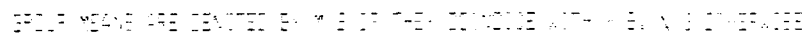
TULY ET AL. IDENTIFIED RANGE METHOD

GROUP	SAMPLE	INDICATES	IN-FLUENCE	IN-FLUENCE	IN-FLUENCE	IN-FLUENCE	IN-FLUENCE	IN-FLUENCE
NO. CLASS.	YEAR	SIZE						
1. UNBLANKED	1,78	14						
2. UNBLANKED	1,81	15						
3. UNBLANKED	1,84	16						
4. UNBLANKED	1,87	17						
5. UNBLANKED	1,91	18						
6. UNBLANKED	1,95	19						
7. UNBLANKED	1,97	20	***	**	**	**		
8. UNBLANKED	1,99	21					**	

SIGNIFICANCE

01. SIGNIFICANCE	***
02. SIGNIFICANCE	**
03. SIGNIFICANCE	*
04. SIGNIFICANCE	

Figure 19. (continued).

[illegible]

ANALYSIS OF VARIANCE TABLE FOR MEANS						ALL GROUPS COMBINED	
SOURCE	DF	SS	MEAN SQUARE	F-VALUE	PROBABILITY	PERCENT OBTAIN WITH LARGER VALUES FOR VARIOUSLY DESIGNATED	CRITICAL
TOTAL	10	10.000					
BETWEEN	2	8.333	4.167	1.000			
WITHIN	8	1.667					
ERROR	6	1.000					
EQUALITY OF VARIANCE TEST: ASSUMPTIONS ARE NOT ASSUMED TO BE EQUAL							
WELCH	2	8.333	4.167	1.000			
BROWN-FORSYTHE	2	8.333	4.167	1.000			
LEVEN'S TEST FOR HOMOGENEITY							
	2	1.000		0.476	0.633		

97

Figure 1 illustrates the evolution of a 2D lattice. The top row shows a square lattice with a central square highlighted. The middle row shows a square lattice with a central square and four adjacent squares highlighted. The bottom row shows a square lattice with a central square and four adjacent squares highlighted, with a legend on the right indicating the symbols: a solid black square for 'x', an open square for 'y', and a solid black circle for 'z'.

98

 HISTOGRAM OF * 01 * 07 * 09 * 10 * 11 * 12 * 13 * 14 * 15 * 16 * 17 * 18 * 19 * 20 * 21 * 22 * 23 * 24 * 25 * 26 * 27 * 28 * 29 * 30 * 31 * 32 * 33 * 34 * 35 * 36 * 37 * 38 * 39 * 40 * 41 * 42 * 43 * 44 * 45 * 46 * 47 * 48 * 49 * 50 * 51 * 52 * 53 * 54 * 55 * 56 * 57 * 58 * 59 * 60 * 61 * 62 * 63 * 64 * 65 * 66 * 67 * 68 * 69 * 70 * 71 * 72 * 73 * 74 * 75 * 76 * 77 * 78 * 79 * 80 * 81 * 82 * 83 * 84 * 85 * 86 * 87 * 88 * 89 * 90 * 91 * 92 * 93 * 94 * 95 * 96 * 97 * 98 * 99 * 100 *

HISTOGRAM OF * 01 * 07 * 09 * 10 * 11 * 12 * 13 * 14 * 15 * 16 * 17 * 18 * 19 * 20 * 21 * 22 * 23 * 24 * 25 * 26 * 27 * 28 * 29 * 30 * 31 * 32 * 33 * 34 * 35 * 36 * 37 * 38 * 39 * 40 * 41 * 42 * 43 * 44 * 45 * 46 * 47 * 48 * 49 * 50 * 51 * 52 * 53 * 54 * 55 * 56 * 57 * 58 * 59 * 60 * 61 * 62 * 63 * 64 * 65 * 66 * 67 * 68 * 69 * 70 * 71 * 72 * 73 * 74 * 75 * 76 * 77 * 78 * 79 * 80 * 81 * 82 * 83 * 84 * 85 * 86 * 87 * 88 * 89 * 90 * 91 * 92 * 93 * 94 * 95 * 96 * 97 * 98 * 99 * 100 *

HISTOGRAM OF * 01 * 07 * 09 * 10 * 11 * 12 * 13 * 14 * 15 * 16 * 17 * 18 * 19 * 20 * 21 * 22 * 23 * 24 * 25 * 26 * 27 * 28 * 29 * 30 * 31 * 32 * 33 * 34 * 35 * 36 * 37 * 38 * 39 * 40 * 41 * 42 * 43 * 44 * 45 * 46 * 47 * 48 * 49 * 50 * 51 * 52 * 53 * 54 * 55 * 56 * 57 * 58 * 59 * 60 * 61 * 62 * 63 * 64 * 65 * 66 * 67 * 68 * 69 * 70 * 71 * 72 * 73 * 74 * 75 * 76 * 77 * 78 * 79 * 80 * 81 * 82 * 83 * 84 * 85 * 86 * 87 * 88 * 89 * 90 * 91 * 92 * 93 * 94 * 95 * 96 * 97 * 98 * 99 * 100 *

HISTOGRAM OF * 01 * 07 * 09 * 10 * 11 * 12 * 13 * 14 * 15 * 16 * 17 * 18 * 19 * 20 * 21 * 22 * 23 * 24 * 25 * 26 * 27 * 28 * 29 * 30 * 31 * 32 * 33 * 34 * 35 * 36 * 37 * 38 * 39 * 40 * 41 * 42 * 43 * 44 * 45 * 46 * 47 * 48 * 49 * 50 * 51 * 52 * 53 * 54 * 55 * 56 * 57 * 58 * 59 * 60 * 61 * 62 * 63 * 64 * 65 * 66 * 67 * 68 * 69 * 70 * 71 * 72 * 73 * 74 * 75 * 76 * 77 * 78 * 79 * 80 * 81 * 82 * 83 * 84 * 85 * 86 * 87 * 88 * 89 * 90 * 91 * 92 * 93 * 94 * 95 * 96 * 97 * 98 * 99 * 100 *

Figure 21. Histogram, ANOVA, and Tukey's test results for question 21.

1894

The following table shows the results of the stepwise multiple regression analysis of the data for the year 1894. The first column shows the variable entered at each step, the second column shows the R^2 value, and the third column shows the F value.

Variable entered at each step: R^2 value: F value:

Figure 22. Summary results of stepwise multiple regression analysis.


```

STEP NO.      2
-----
VARIABLE ENTERED  3 4994
          1
MULTIPLE R      0.4987
MULTIPLE R-SQUARED  0.2487
ADJUSTED R-S QUAD  0.2487

SQUARED OF F-STAT  0.4987

ANALYSIS OF VARIANCE
          SUM OF SQUARES  DF  MEAN SQUARE  F-VALUE
REGRESSION  0.125000      1  0.125000      1.0000
RESIDUAL    0.375000     10  0.037500
TOTAL       0.500000     11

ANALYSIS OF VARIANCE FOR STEP 2
          SUM OF SQUARES  DF  MEAN SQUARE  F-VALUE  PROB > F  PARTIAL  CORR  T-STAT  P-VALUE  LEV
1  0.125000  1  0.125000  1.0000  0.3343  0.3162  0.3162  0.3162  0.3162  0.3162
2  0.375000  10  0.037500  0.3343  0.5657  0.4838  0.4838  0.4838  0.4838  0.4838

ANALYSIS OF VARIANCE FOR STEP 3
          SUM OF SQUARES  DF  MEAN SQUARE  F-VALUE  PROB > F  PARTIAL  CORR  T-STAT  P-VALUE  LEV
1  0.125000  1  0.125000  1.0000  0.3343  0.3162  0.3162  0.3162  0.3162  0.3162
2  0.375000  10  0.037500  0.3343  0.5657  0.4838  0.4838  0.4838  0.4838  0.4838
3  0.000000  0  0.000000  0.0000  1.0000  0.0000  0.0000  0.0000  0.0000  0.0000
TOTAL       0.500000     11

```

Figure 23. Final step in the stepwise multiple regression analysis.

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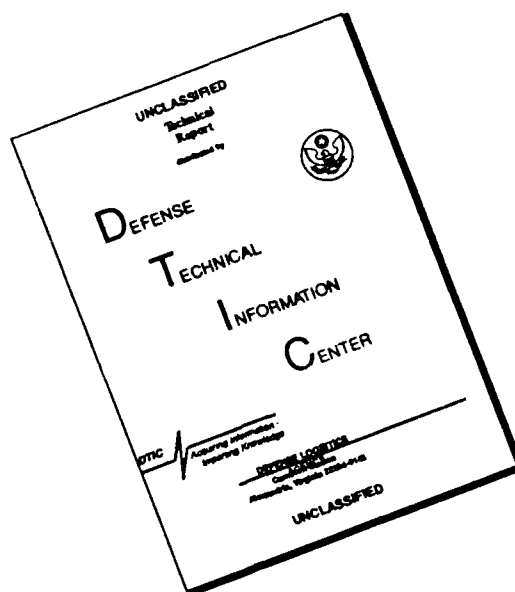
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